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THE

MANUFACTORIES AND MANUFACTURERS

THE EVENING TELEGRAPH
PHILADELPHIA

OF

PENNSYLVANIA

OF

THE NINETEENTH CENTURY.

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PREFACE.

OWING to circumstances entirely beyond the control of the Publisher, there has been delay in the issue of this work. The crisis of September, 1873, and the resulting depression of manufacturing interests made manufacturers indisposed to furnish information the accuracy of which a few months or even weeks might radically change. The process of compilation became therefore exceedingly slow, and it has only been by great exertion and by taking every advantage of the more settled and improved condition of business, that the work has been brought to completion at this time. Every effort has been put forth to protect the interests of the establishments sketched at an earlier day by the revision and correction of the sketches. This has entailed considerable expense, but the publisher trusts that he will receive his reward in the recognition by the public of his earnest endeavor to present something like a reliable and worthy record of the principal manufactories and the most prominent manufacturers of the greatest manufacturing State in the Union.

PHILADELPHIA,
May, 1875.

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THE MANUFACTORIES and MANUFACTURERS OF PENNSYLVANIA.

BALDWIN LOCOMOTIVE WORKS.—Among the vast industrial establishments of Pennsylvania there is none, perhaps, which excites more general interest than the Baldwin Locomotive Works, located at Broad and Hamilton streets, Philadelphia. With a career which is co-existent with the gigantic railway interests of the Western Continent, it commands attention not only for the immensity of its scope, but for its illustration of what the energy and inventive genius of a few men are capable of achieving. Its very inception is inseparably connected with the railroads of America, and the history of its progress is the history of the suggestion and realization of the most vital of her internal improvements. The United States are webbed together by a net-work of steam roads, which have incalculably enriched them by the rapid development and utilization of all their varied resources; and there is of these roads scarcely one which is not linked with this great workshop of American railways. This establishment, which to-day is known throughout the length and breadth of the land, was of humble origin, growing slowly and steadily in proportion and prosperity under the careful nurture of its founder and those who subsequently joined him. The works take their name from their originator, Matthias W. Baldwin, who commenced, with David Mason, on Minor street below Sixth, the manufacture of book-binders' tools and cylinders for calico printing. They were sadly hampered at first, from want of power, and eventually were compelled to purchase a steam engine. It was crudely designed and rudely constructed, and failed to meet their necessities; whereupon Mr. Baldwin planned and constructed his first stationary steam engine to supply its place. It is a fine commentary upon the success he thus secured that this piece of mechanism, after a service of more than forty years, still performs an important function in the mammoth establishment on Broad street. This first production of his inventive genius was well adapted to the limited business of the Minor street shop; and it may well be doubted if he, at that time, in his most sanguine moments, even conceived that this fruit of his mechanical skill was to be the precursor of an industry scarcely equalled anywhere in its scope and prosperity. This engine may be described as follows:

"On a bed plate about 5 feet square, an upright cylinder was placed; the piston rod connected to a cross bar, having two legs, turned downward and sliding in grooves on the sides of the cylinder, which thus formed the guides. To the sides of these legs, at their lower ends, was connected by pivots an inverted U-shaped frame, prolonged at the arch into a single rod, which took hold of the crank of a fly-wheel, carried by upright standards on the bed plate. Thus the whole engine was brought within the smallest possible compass."

This completed, and its efficiency amply proven, the firm was soon called upon to devote its entire attention to the manufacture of stationary steam engines. Orders came in rapidly, over-taxing the limited capacity of their shop. Still, there was no imperfect workmanship; on the contrary, Mr.

Baldwin endeavored to improve upon each edition, adding strength, increasing power, seeuring simplicity by a careful and intelligent study of that wonderful piece of mechanieal engineering whieh was then in its infaney. By this eonstant applieation he edueated his mind to cope with the profounder problems of loeomotive eonstruetion which then for the first time began to engage the attention of Amerieau inventors. As early as 1830, a few loeomotives were imported from English workshops, and the subject of rapid transit soon aroused publie interest. One loeomotive in that year was built at the West Point Foundry, New York, but it proved unsueeessful, and it was declared that Amerieau genius had not arrived at that point of perfection when it might attempt sueh a feat in mechanieal labor. Mr. Baldwin resolved to refute this statement, and deeided to undertake the experiment of eonstrueting a loeomotive upon plans he himself had matured. Upon the urgent request of Franklin Peale, proprietor of the Philadelphia Museum, he at length produeed a miniature one for exhibition. He had to guide him in this labor a few imperfeet sketehes of English loeomotives; and he wrought sueeess only by the severest tax upon his energy and patienee. This task he aeeomplished amid a variety of eheeks and hindrances; and on April 25th, 1831, this "miniature loeomotive was put in motion on a eireular traek made of pine boards, eovered with hoop iron, in the rooms of the Museum. Two small cars, containing seats for four passengers, were attaehed to it," and this novelty drew immense erowds to witness its sueeessful operation. Coal and pine wood were used as fuel. The experiment proving an unqualified sueeess, the maker soon after reeeived an order to construet a loeomotive for the Philadelphia, Germantown & Norristown Railroad Company. He eommenced this more serious task with some misgivings, mainly ereated by the want of the proper applianees for the eompletion of sueh a work. There were in this braneh of labor few, if any, skilled meehanies at the time, and the tools neeessary for the work could be obtained only with great difficulty. Despite all the eheeks whieh eonstantly beset him, working himself on all parts of the engine, he at length aeeomplished the labor, and named his produetion "Old Ironsides." The trial trip was made November 23d, 1832. There were imperfeetions whieh were speedily remedied, and the engine became a pronouneed suceess. The company aeeepted it forthwith, and for the twenty years following it was in eonstant service. It was the object of great curiosity by both the inventive and non-inventive part of the community. Its reputation was spread far and wide by the publie press, and the name of the inventor became as familiar as an "household word." The weight of this engine was five tons, and its price $3500. Its builder hesitated in the work of locomotive eonstruetion by reason of the almost insuperable obstaeles which impeded his progress in it; and at one time even deeided to abandon it altogether. But the genius of invention was restless in him. He was faseinated with the engineering problem into whieh he had already ventured. The result was renewed and faithful applieation to the work, showing itself in improvements which always led to important results. In 1834, he built a loeomotive for the Charleston & Hamburgh (South Carolina) Railway Company, embodying all the improvements he had seeured sinee his earliest venture. This engine was named the "Miller," after E. L. Miller, of that road. In the meantime the State of Pennsylvania eontraeted with him to manufaeture one for the State road, whieh ran from Philadelphia to Columbia. This was eompleted in June, 1834, and was named the "Lancaster." It weighed 17,000 pounds and drew at one time nineteen loaded cars. This unprecedented performanee was announeed on every hand, and exeited general admiration. The suceess was so apparent that additional loeomotives were ordered by the State authorities, and two of them were eompleted during the same year. Another was built for the Philadelphia & Trenton Railroad, so that in the year 1834 Mr. Baldwin had the satisfaetion of turning out five perfectly equipped loeomotives. The business had now outgrown its original quarters, and he deeided upon the loeation of a new shop at Broad and Hamilton streets, the site of the present works. An L-shaped, three story briek building, with fronts on both thoroughfares, was eommeneed, and completed in 1835, and to it the business was immediately removed. This original structure still remains, being ehiefly used now as an offiee, drawing room and prineipal machine shop. Thenceforward the firm devoted its energies almost exclusively to the eonstruetion of loeomotives, eompleting fourteen in 1835; forty in 1836; forty in 1837; twenty-three in 1838; twenty-six in 1839; and nine in 1840. They were graded as follows: first-class, weight 26,000 pounds; seeond-class, weight 23,000 pounds; third-class, weight 20,000 pounds. In 1836–'37 oeeurred a great finaneial crisis, which prostrated the industry of the land. It fell heavily upon Mr. Baldwin. His liabilities, neeessarily ineident to the great business he was carrying on, were very large, and like thousands of others, owing to the general

prostration of affairs, he was unable to realize upon any of his contracts. In this strait of affairs he was compelled to suspend work for a time, and called his creditors together in order to effect the most advantageous settlement with them. They consulted, and finally agreed to grant him an extension, with the understanding that he should continue business and pay the principal and interest of his indebtedness as soon as possible. This he accomplished in five years from the period of his suspension. These difficulties necessarily reduced the business of the works, as will be readily seen from the above statement, the demand for engines falling off greatly. Still, he applied himself with undaunted industry to his labors, and signalized them by an important improvement in the use of coal for fuel, in wheels and trucks by constructing them of chilled iron, in standard gauges and in other appliances, which have since become distinguished features in the productions of this establishment. In 1839, he associated himself with Vail & Hufty, and the business was conducted under the firm-name of Baldwin, Vail & Hufty until 1841, when the last named withdrew, and Baldwin & Vail composed the firm until 1842. In 1841, the first locomotive constructed here for a foreign country was shipped to Austria. In 1842, Mr. Baldwin secured a patent for the famous six-wheel connected engines, which met with immediate and general favor, and, with some new improvements, are largely in use to-day. The first engine upon this newly devised plan was built in 1842 and sent to the Georgia Railroad, at the instance of J. Edgar Thomson, then Chief Engineer and Superintendent of that line. It weighed twelve tons, and drew, in addition to its own weight, 250 tons up a grade of 36 feet to the mile. New orders speedily followed, the recent inventions were applauded by all railroad men, success followed success, and the establishment encountered a new tide of prosperity. This was a fortune richly merited by the founder of the concern, who never succumbed in the face of the greatest discouragements and reverses, and who lived strictly up to the motto of "perseverance, patience, industry." In 1843, twelve engines were constructed; in 1844, twenty-two, and in 1845 twenty-seven, nearly all of them of the new pattern. The partnership with Mr. Vail having been dissolved in 1842, Asa Whitney, who had been Superintendent of the Mohawk & Hudson Railroad, was admitted to the business, and the firm-name of Baldwin & Whitney continued until 1845, when the latter withdrew. The six-wheel engines meeting with so general a favor induced their inventor to increase their size; and in 1844 three, of twenty tons each in weight, were built for the Western Railroad, of Massachusetts, and six, of eighteen tons each, for the Philadelphia & Reading Railroad. In the year following, three engines were produced for the Royal Railroad, of Wurtemberg, each weighing fifteen tons, having six wheels, four of them being 60 inches in diameter and coupled. The recent improvements effected were embodied in these locomotives, and they were regarded in many ways superior to those then being manufactured by the Stephensons in England. The establishment signalized December, 1845, by turning out its first eight-wheel engine, with four drivers and a four-wheeled truck. This was considered to have a superior adaptation for passenger traffic, as its motion was easier and steadier. Several were soon built after this model for the South Carolina Railroad Company, the Camden & Amboy Railroad Company and the Wilmington & Baltimore Railroad Company; and from this time forward the construction of six-wheeled engines may be said to have been abandoned. In 1846, forty-two engines were built; in 1847, thirty-seven; in 1848, twenty; in 1849, thirty; in 1850, thirty-seven, and in 1851, fifty. In 1848, when the Vermont Central Railroad was nearing completion, its President, Governor Paine, offered Mr. Baldwin the sum of $10,000 for a locomotive which would run a passenger train at the rate of sixty miles an hour. The latter commenced the work immediately, and finished it in 1849. The new engine was named the "Governor Paine," was successfully tried, and answered in every particular the requirements stipulated in the contract. It attained a speed, indeed, far greater than was ever anticipated; and it is said that in starting from a rest it ran a mile in forty-three seconds. Other engines of like character and power were turned out during the ensuing year, and all secured similar triumphs. In 1848, '49 and '50, improvements were made by the firm in the construction of boilers, axles and running gear. In 1851, forty-nine engines were manufactured, and the establishment had upon its books orders ahead which would require at least a twelve-month of steady work to fill. In 1853, sixty engines were the net product of the year's labor, and in 1854, sixty-two. Matthew Baird, who since 1836 had been a foreman in the works, was admitted as a partner. For many years he was at the head of the firm, and became widely known and respected for his business tact and his remarkable skill as a mechanician and inventor. Twelve engines were constructed in 1852 for the Pennsylvania Railroad, each weighing 56,000 pounds. After some modifications and

necessary improvements, the ten-wheeled locomotives assumed a place in the Baldwin classification, and a large number were built during the few years ensuing. From 1855 to 1860, both these years inclusive, the engines built by this establishment were as follows: in 1855, forty-seven; in 1856, fifty-nine; in 1857, sixty-six; in 1858, thirty-three; in 1859, seventy; in 1860, eighty-three. These figures are a sufficient indication of the growth of the business at that time and of the celebrity which the concern had achieved. The war, which in the latter year convulsed the nation, unsettled all business, and that of manufacturing locomotives proved no exception to the rule. A large number of artisans employed at these works voluntarily resigned and joined the Union army, while others, from the stagnation of all industry, were discharged. But forty engines were made during that year. In the heat of the excitement produced by the firing on Sumter and succeeding events, it was once seriously proposed to turn the locomotive works into a manufactory of shot and shell. It was soon discovered, however, that they had a more important function to perform, and that in the line of their original business, viz.: to furnish the motive power for the transportation of troops and supplies. Travel on the public roads marvellously increased, and the demand for power may be estimated by the production of these works during the years of the Rebellion. In 1862, seventy-five locomotives were built; in 1863, ninety-six; in 1864, 130; and in 1865, 119. The Government made heavy exactions upon the works to supply its military roads, while the extensive coal and iron companies, whose business was greatly stimulated by public necessities, required the largest and heaviest engines to move the products of the mines to the great supply depots. Many additional improvements were made during this period, not the least important of which was the introduction of steel in their construction. On the 7th of September, 1866, Mr. Baldwin died. The loss of the founder of this huge industry, who from its birth had watched over its unfolding with anxious, paternal care, whose genius and skill had made for it a national reputation, proved a severe shock. From this it revived under a re-organization, which was effected in 1867, under the title of "The Baldwin Locomotive Works," M. Baird & Co., proprietors. In this co-partnership there were associated with Matthew Baird, George Burnham and Charles T. Parry, both of whom had been connected with the establishment from an early period in its history, the former in charge of the financial department, and the latter in the capacity of general superintendent. In 1870, Edward H. Williams, William F. Henszey and Edward Longstreth were admitted to the partnership. Mr. Williams had been identified with various prominent railroad interests since 1850, while Mr. Henszey had been mechanical engineer and Mr. Longstreth general superintendent of the works for some years prior thereto. The business under the new management increased with remarkable rapidity, which may be best judged from the following statement: In 1866, 118 locomotives were built; in 1867, 127; in 1868, 124; in 1869, 235; in 1870, 280; in 1871, 331; in 1872, 422; in 1873, 437. In the latter year the firm of M. Baird & Co. expired, and the business was and is now continued under the title of Burnham, Parry, Williams & Co., the house consisting of all the former partners excepting only Mr. Baird. The establishment, which has thus been advancing to perfection through a period of nearly half a century, is one of the most remarkable industries to be found in this or other countries. It covers an immense area of land, which has been purchased and built upon gradually in obedience to the demands of the fast enlarging business; and it has been supplied with a vast array of appliances, which are the result of years of close study. It is doubtful if there can be found elsewhere any establishment with like interests which has a more elaborate array of facilities for the perfection of every piece of mechanism appertaining to a locomotive than this one. It possesses the inherent capacity of adapting itself to the production of every class of improvements, and in this respect presents a striking advantage over less elastic manufactories. It is almost in the very heart of the coal and iron producing regions; it is located in one of the most advantageous positions for cheap transportation, and conveniently for the transfer of its products to foreign ports; and, further, it is in a community celebrated for its skilled artisans. All these are enviable facilities, and have done much to give it the eminence it now holds. Since the completion, with grave misgivings, of the "Old Ironsides," more than 3000 locomotives have been constructed at the Baldwin Works, and shipped to every corner of the habitable world, and the labor of production goes on apace. The scene to be met with in the foundries, blacksmith shops, machine shops and other departments, devoted to a particular class of work, is of the most interesting character. In these appear, in different stages of progression, the *disjecta membra* of the locomotive, and then the completed work, a marvel of mechanical skill and invention. The system adopted for the government of this

huge manufactory has been reduced to a nicety. Among the thousands of operatives, there is no jar or miscalculation. The workmen are educated mechanics, whose labors have chiefly been in the way of locomotive or stationary engine construction, while the members of the firm have a complete knowledge of the peculiar needs of the gigantic business which they annually transact. They stop at no expense to perfect the tools necessary in the various stages of their work, and to test the advantage of new inventions. A distinguishing feature in the method of construction here observed is the absolute uniformity and exactness of the various parts of the locomotive. This is wholly due to the extensive system of standard gauges and templets by which all the various pieces in use are adjusted. Relative to this important characteristic, the firm state:

"The original templets are kept as standards, and are never used on the work itself, but from them exact duplicates are made, which are issued to the foremen of the various departments, and to which all work is required to conform. The working gauges are compared with the standards at regular intervals, and absolute uniformity is, therefore, maintained. This system is carried into every possible important detail. Frames are planed and slotted to ganges, and drilled to steel-bushed templets. Cylinders are bored and planed, and steam ports, with valves and steam chests, finished and fitted to gauges. Tires are bored, centres turned, axles finished, and cross heads, guides, guide-bearers, pistons, connecting and parallel rods planed, slotted or finished by the same method. Every bolt about an engine is made to a gauge, and every hole drilled and reamed to a templet."

It will be quickly understood that where there is such an admirable system of forms and measures, it is comparatively easy to produce duplicates of the same part, or more; and herein is to be found the secret of the rapid construction of locomotives by this concern and the watch-work exactness of all their mechanism. These works are engaged in supplying large contracts with foreign roads and governments; and the variety and extent of its business will be understood, when it is known that during the past year engines have been forwarded to railroad companies in South America, Cuba, Canada, New Brunswick, Russia and the Grand Duchy of Finland. In addition, they have supplied most of the motive power for the Don Pedro II. Railway, of Brazil, which is owned and operated by the Brazilian Government, having furnished locomotives for that railway since 1862. They have also furnished locomotives for the railways of Peru and Chili, which have been constructed by Henry Meigs, the great American contractor. The locomotives which were shipped to Russia were built for the use of anthracite coal, new and almost inexhaustible deposits of which have been recently discovered there. The following extract from a letter written by Hon. Henry D. Moore, formerly of Philadelphia, which is dated St. Petersburgh, December, 1872, describes the reception of these engines:

"On Saturday I had the great pleasure of being one of the company at the trial of your locomotive on the Nicholas road; and I can assure you it was a proud day for us Americans, because it was a success from beginning to end. We had on twelve of the largest passenger cars, and she took them along with perfect ease, at the rate of sixty versts (or forty miles) per hour, and this on an up grade. The Russian gentlemen who were present were not only pleased, but delighted, and what seemed to gratify them so much was the splendid action of the machine in burning anthracite coal; and well it may be, for to them it solves a question of great importance at this time. Wood is getting very scarce in some portions of the country, and the Emperor has received petitions from some localities, asking him to forbid the use of wood any longer on the railroads."

About ninety versts from the capital a grand banquet took place, when success to the enterprise was toasted, and speeches highly laudatory of American skill were delivered. *La Nova*, a journal published in St. Petersburgh, on the 13th of December, gave a long and detailed account of the trial trip, and thus spoke of the experiment:

"We have already informed our readers of the experiments made with an anthracite burning locomotive. The trial, which took place the 25th inst., between St. Petersburgh and Loubane, has been crowned with complete success. The engine has performed its work in a manner to surpass all predictions, so that the train, made up of ten cars, overcame high grades with a speed of sixty versts per hour. The great advantage of this new appliance is the economy resulting from it, alike to the railroad administration and the country itself. We calculate that the quantity of anthracite used for a trip of 130 versts (87 miles) amounts to a weight of 62 pounds (2232 pounds), while the consumption of wood to travel over the same distance would be 2½ cubic sagenes (6.79 cords). The southern part of Russia is poorly supplied with wood; but, to compensate for this poverty, it abounds in unexplored mines of anthracite coal, many even (for example those of Grouchewsky) are noted for products of a superior quality. Thus, as wood costs much more than coal, and as, in addition, the money disbursed for the latter does not leave the country, inventors are urged from this sense of economy to seek a means of firing engines with anthracite. But all the proposed processes have given no good practical results. The principal obstacle to overcome is the intensity of heat produced by anthracite; the internal machinery is used up very quickly, and disabled in a very short time, while the repairs entail great expense each time. This interesting problem

has just been solved by Messrs. Baird & Co. Their engine is composed principally of a fire-box nine feet long, with (rows of flues) grate bars, in which water constantly circulates. To facilitate the running of the machine, and to regulate its movements at will, all its machinery is within reach of the engineer. The locomotive to which we refer weighs 32½ tons, and costs £3525 sterling, which is nearly equal to 28,000 roubles."

The financial crisis of 1873, checking railroad enterprise, caused a diminution in the demand for locomotives, but as the country is recovering from the shock, orders are coming in more rapidly. When working at their full capacity, the works employ over 2800 men, whose weekly wages exceed $40,000. During the year they will use over 19,000 tons of hard coal, 6000 barrels of charcoal, 6,000,000 pounds of bar-iron, 13,000,000 pounds of pig-iron, 4,000,000 pounds of boiler iron and steel, 2,000,000 pounds of tank and sheet-iron, 60,000 pounds of boiler flues, 6000 chilled wheels (manufactured in other establishments), 400 barrels of copper, besides other materials in proportion. From what has been said a fair but still an inadequate conception of the remarkable capacity of these works may be obtained. They are regarded as the largest in this country, if not in the world, and their history is the history of some of the most important achievements of inventive genius this century has produced, completely solving the problems of safe and rapid transit. It is fitting that this much should be said before touching upon the individual careers of the men who, from the founder to his latest successors, have brought the Baldwin Locomotive Works to present eminence in the world of industry.

MATTHIAS W. BALDWIN was born in Elizabethtown, New Jersey, December 10th, 1795. William Baldwin, his father, was a carriage maker, whose exemplary character and genial nature won for him the regard of all who came in contact with him. He left his family in the possession of a comfortable fortune, but through the mismanagement of his executors this maintenance was almost wholly lost. His widow was thus left to her own exertions for the support of herself and family. To the necessity for economy and self-reliance thus imposed upon Matthias is probably due the development of his genius for invention. He early exhibited a remarkable fondness for mechanical contrivances, and gave frequent proof of the inheritance of his father's talent for construction. His toys, at first simple and then more complicated, designedly increased and varied to foster his inclination, were dissected and critically examined by him, and this combination of entertainment and instruction led to his own construction of models. In his sixteenth year he was apprenticed to Woolworth Brothers, jewelry manufacturers, in Frankford, Pennsylvania, where he earned a high reputation by his strict attention to business, and by his firmness in moral discipline, and soon became an expert workman, respected alike by his employers and associates. He entered the extensive jewelry manufactory of Fletcher & Gardner, on Chestnut street, Philadelphia, in 1817. His skill and conscientious application to his various duties and the interests of his employers soon rendered him an invaluable attache of the establishment. As a workman he became remarkably expert, and his productions, in novelty of design and delicacy of finish, have never been surpassed. He signalized the year 1819 by entering into business upon his own responsibility; but by one of those sudden fluctuations which are incident to this trade, it became depressed and he relinquished the venture. His genius naturally gravitated towards the invention of machinery, and the result of his application to this study was the production of an apparatus which greatly simplified the process of gold plating. At this time the tools and mechanical appliances used by book-binders were all imported, and he determined to supply a long-standing necessity. He therefore united with a competent machinist, David Mason, in their production and improvement. The enterprise was successful, and so admirable were the quality and finish of their tools that the book trade was soon rendered independent of foreign manufacturers. His next invention was the printing of calicoes by means of cylinders, instead of the slower, more costly, and tedious process by hand presses, and this improvement in a short time revolutionized the entire business. The demand for these rollers exceeded the facilities for their supply which the firm then enjoyed, and additional accommodations were sought. Henceforth there was a steady progression in prosperity and mechanical devices. The hand machines, the foot lathes gave way for newer appliances run by horse power, and this in turn yielded to the now universal motor—steam. Mr. Baldwin more than forty years ago purchased an engine—an exceedingly crude affair—which he soon after supplanted by one of his own design, in every way its superior. This compact little engine, of six horse power, occupying a space of only six feet square, is still in use in the works at Broad and Hamilton streets, driving machinery in the boiler shop. This success brought a flood tide of business upon the firm, which for a long time was profitably engaged in the exclusive construction of stationary engines. He had at

this time determined upon the difficult labor of building a locomotive, and was at the time preparing drafts for it. The Camden & Amboy Railroad Company, in 1830, imported the first of the kind, and he studied its complicated mechanism as far as circumstances would permit, and shortly after, in compliance with the urgent request of Franklin Peale, of the Philadelphia Museum, built a miniature engine after the plan of Eriesson. This was exhibited, in April, 1831, upon a circular track, and excited great curiosity. In his first full-sized locomotive, constructed soon after for the Philadelphia & Germantown Railroad Company, he abandoned the single upright cylinder, adopting a then new device for generating and economizing steam. This venture proved highly satisfactory; but he seems to have been, for the only time in his remarkable career, discouraged by the numerous obstacles which presented themselves. He rallied, however, and thenceforward applied himself with all his wonderful patience and energy to conquer a problem in mechanics which should yield him no uncertain or ephemeral reputation. His second achievement surpassed his first, embodying many improvements which were the results of protracted study. Orders followed rapidly; the establishment accommodated itself to the enlarging business; the corps of mechanics was gradually augmented; and thus, under his watchful supervision, the works slowly but steadily unfolded into the gigantic proportions which they assume to-day. The financial crisis of 1837 for a time embarrassed him; but at his own request his creditors granted him an extension of time, and had the satisfaction of receiving within five years payment in full for the principal and interest due them. He honorably fulfilled all his engagements, and his unblemished integrity as a man of business won for him a sound credit and an enviable name. With, at all times, a deep interest in the perfection of the mechanic arts, and with a warm sympathy for those who were struggling up the ascent he himself had toiled, he entered heartily into all practical schemes for the promotion of scientific knowledge. To this end he, with others, founded the Franklin Institute, designed for the culture of young men debarred from other sources of technical instruction. He was a gentleman of genial manners, an exemplary churchman, and a philanthropist who bestowed large benefices upon local and other institutions which appealed—and never in vain—to his generosity for support. He died on September 7th, 1866, universally regretted.

GEORGE BURNHAM and CHARLES T. PARRY, the two senior members of the firm of Burnham, Parry, Williams & Co., entered the Baldwin Locomotive Works in 1836, when they were boys, and when the establishment was in its infancy. Up to the time of their employment in it, but fifty locomotives in all had been made. Since that time they have participated in the construction of more than 3000. The former passed through all the offices in the executive management of the works, and has now the general supervision of its financial affairs. The latter commenced his career in the pattern room, from which he passed to the drawing room, and thence to the responsible office of Chief Superintendent of Construction, a position he ably filled until 1866, when he and Mr. Burnham purchased the Baldwin interest, and became partners in the firm of M. Baird & Co.

EDWARD H. WILLIAMS was born, June 1st, 1824, in Woodstock, Vermont. His father was a thrifty, well-to-do New England man, who granted every facility for his education. The son studied medicine, and for a time followed its practice. This was a profession, however, not sufficiently elastic for one of his energetic character, and he sought and found a more congenial sphere of labor. In 1851, he was made Assistant Chief Engineer of the Champlain & St. Lawrence Railroad. In 1854, he became connected with the Michigan Southern Road, and subsequently was prominently identified with the Milwaukee & Prairie du Chien and Galena & Chicago Union Railroads. In the year 1860, having for some time previous thereto ably filled the post of Assistant General Superintendent, he was promoted to the position of General Superintendent of the Pennsylvania Railroad, which he held for ten years. In 1870, he became a partner in the Baldwin Locomotive Works. He, it is perhaps needless to say, is well known as a practical railroad engineer, and his extensive and varied knowledge, which is the fruit of long experience, has become essential to the successful management of this important industrial establishment.

WILLIAM P. HENSZEY was born in Philadelphia in 1832, the year in which Matthias Baldwin constructed his first locomotive. He graduated from the Central High School with distinction, and while enrolled as a student paid special attention to the study of the mechanic arts. In deference to the wishes of his parents, who intended him for mercantile pursuits, he entered a store and for some years continued in this line of business. The bent of his talent was, however, in another direction, and he was impatient for the opportunity—which at length occurred—to fit himself for the

responsible duties of a mechanician. In 1859, he entered the Baldwin Locomotive Works as a draughtsman, and his advancement was so rapid that within three years the entire management of the drawing rooms and mechanical department was vested in him. In 1870, he became a member of the firm, and still retains the important office of superintendent of the draughting room. During his connection with these works, more than 2000 engines have been constructed from his own drawings and specifications. This much can be said of few other locomotive engineers in the world.

EDWARD LONGSTRETH is the youngest and at the same time one of the most important members of this firm. He was born in Bucks county, Pennsylvania, on the old Longstreth farm, in 1839, his parents being Quakers. He received a thorough education, and early displayed a penchant for the study of mechanics. He entered the Baldwin Locomotive Works in 1857, as an apprentice, and served faithfully five years at his trade. During this apprenticeship he exhibited rare energy and studiousness, and was always punctual at his post. Before four years of this service had elapsed, so remarkable had been the development of his mechanical as well as inventive skill, he was appointed to the foremanship of one of the departments. In this position he turned his mind to the study and perfection of the gauge system, which is now the characteristic feature of this establishment. In 1867, he was made superintendent of the works, and in 1870, was admitted to the partnership. At present he has the entire control of the construction department.

JOHN H. CONVERSE, a native of Vermont, who, previous to his admission to the present firm, occupied the important position of confidential business clerk in the firm of M. Baird & Co., is a gentleman of fine culture and the possessor of great executive ability. He became a partner in the present organization, which followed the dissolution of the co-partnership of the house of M. Baird & Co.

INDUSTRIAL WORKS, William B. Bement & Son, Proprietors, Philadelphia. In the year 1851, the senior partner, accompanied by his nephew, G. A. Colby, arrived in Philadelphia, and the two associated themselves with E. D. Marshall, who was then the owner of the machine shop from which the present works sprang. The firm was known as Marshall, Bement & Colby, and engaged in the manufacture of machinists' tools. The building they occupied is yet standing near the centre of the present works, and has three floors of about 90 by 45 feet; and even of this small amount of space a considerable portion was leased to other parties. For about three years the business continued in their hands, and, in 1854, James Dougherty, a practical and thorough iron founder, became a partner, and the style was changed to Bement, Colby, Dougherty & Co. Subsequently Mr. Colby retired, and the firm's name was known as Bement, Dougherty & Thomas; then Bement & Dougherty, which last continued until 1870, when Mr. Dougherty retired, and gave place to Clarence S. Bement, son of the present senior partner. Subsequently (1874) J. M. Shrigley was also admitted to the firm. The site of the Industrial Works embraces nearly all the space bounded by Twentieth, Twenty-first and Callowhill streets, and the Philadelphia & Reading Railroad. Its buildings present a continuous front on Callowhill street of 372 feet, and on Twenty-first street of 265 feet, and contain a floor space of nearly 2½ acres, or the equivalent of a two story building 50 feet wide and over 1000 feet long. Branches of the Philadelphia & Reading Railroad enter the premises and deliver coal and iron at convenient points. The pattern storehouse is a fire-proof building nearly 200 feet long by 40 feet wide, containing on its three floors the patterns for more than 180 machines. These represent pretty thoroughly the best practice of the present day in the various operations of the machine shop, smith shops, boiler shop, and foundry, from the formation of the most delicate parts of rifles, or sewing machines, to the turning, planing, and fitting of the parts of the largest engines and machinery. Many of the designs have originated at these works, while others have here received such improvements as have added to their usefulness. The drawings representing them are most conveniently arranged in the draughting room, a light and airy apartment 50 feet square, being the entire second floor of the office building. The greatest care and skill is exercised in making the patterns, which, unlike those formerly constructed by means of the saw, plane and lathe, are now principally shaped and finished by hand. The designs of this establishment, therefore, possess a sort of individuality, and occupy a front rank for combined massiveness, elegance, and adaptation to their various purposes. Another feature in the construction of machinery has become much more general within the past few years, for which the mechanical world is largely indebted to the Industrial Works. The same general ideas

Industrial Works, Hyde, near Manchester.

which displayed themselves in harsh and crude outlines found further expression in making the frames of machines as plain and bare as possible, and attaching all necessary projecting parts by bolts. The objects sought were simplicity in the patterns, and consequent ease in making the castings; but these were attained only by the use of much unnecessary material, and the sacrifice of both strength and beauty. True economy, therefore, demanded that as far as possible the framing of a machine and its permanent attachments should be in one piece of casting, and this principle has been faithfully pursued at these works. In the foundry are furnaces and cranes capable of melting and distributing twenty-five tons of iron at one heat, with all the facilities for making, moving, and drying the various moulds and removing the castings when made. The selection of iron is a matter of great importance. In these works no foreign iron is used. By proper selection and mixture of the numerous brands of American iron, castings can be made of excellent quality, and suitable for any possible purpose. The reputation of the Industrial Works for sound and beautiful castings extends, not only to all parts of the United States, but to Europe, and is evidence of the variety and value of the irons produced in Pennsylvania. All the furnaces, cranes, immense ladles, and other appliances, with which castings weighing as much as eighteen tons each have been made, are of the firm's own manufacture, and they have fitted out full foundries of much greater capacity than their own. On the premises also there is a small but completely equipped brass foundry, which is not so much a source of profit or economy in itself, but which the proprietors erected as a means of being able to control with certainty and uniformity the quality of the brass castings used in their machinery. The smith shop contains a large number of forges, two steam hammers in constant use, cranes, case-hardening furnaces, etc., all of which are of the firm's own make. The most skilful workmen attainable are here employed, as the variety of forms are almost infinite, and new ones are daily demanded. The machine shops are well provided with the great variety of tools and machines rendered necessary by the demands of modern engineering. The ground floor covers a space of about 450 feet in length and 50 feet wide, and the second story, of nearly the same dimensions, is used for the shaping, fitting, and adjusting of the lighter class of tools—those from one to three tons in weight—while the first or ground floor is devoted to the fabrication of those of a larger and heavier description. Many of the machines used are of massive proportions and great power. Such are a planing machine, capable of planing a horizontal surface 10 feet wide and 45 feet long; another which will plane a vertical surface 12 feet long and 8 feet high; a lathe which will turn a piece of work 8½ feet in diameter; a radial drill, with an arm 10 feet long; a vertical machine for boring and turning large wheels and pulleys up to 8 feet in diameter; and cranes that easily lift 20 tons at one motion. Others, not remarkable for size, are noteworthy for their ingenious construction and labor-saving qualities. Among these are a grooving and mortising machine for iron and steel; a double machine for turning the rims of pulleys, and another for drilling and tapping their hubs for set-screws; one for making pins, screws, etc., from the bar; one for cutting the teeth of wheels by movements entirely automatic, with a variety of others designed for special purposes. In order to secure the greatest possible accuracy in cutting the threads of screws, particularly such as are used to move the tool carriage in engine lathes, the firm have had a standard screw made to their order by Sir Joseph Whitworth, and have erected a lathe, upwards of 45 feet long, expressly to receive it. This serves as the model for all similar articles. There are also a great number of fixtures and tools, each of which is constructed expressly to perform one single operation; the object in most of these cases being not so much to economize time as to insure a greater degree of correctness in the respective operations than could be made certain by other means. These, with the large number of lathes, planers, drilling, shaping, boring, slotting, and milling machines, and numerous cranes conveniently placed for moving heavy weights, make the machine shop of the Industrial Works one of the best equipped in the United States. The articles constructed at these works are various as well as ponderous. The axle-lathe and car-wheel borer, made by this firm, may be found in almost every railway shop and car-building establishment in the country. A drilling machine, with two spindles, for drilling the bolt holes in steel rails; and another, with six spindles, for drilling at once the six bolt holes in the arch bars of car trucks, are widely known and approved. A large and expensive machine for the special purpose of planing the edges of locomotive frames, in which two independent tools are working at once, and each at any required angle, has been found economical to a high degree, and is a fine example of special construction. The firm have also built a new steam riveting machine, which has proved very successful, and is probably the largest and most complete in use. It weighs over eighteen

tons, and contains one piece of forging which alone weighs more than five tons. They also make a planing machine expressly for planing the edges of boiler sheets. Both this and the riveting machine, while doing their work very rapidly, are almost silent in their movements, so that by their use the fearful din of a large boiler shop is abolished, a result almost as desirable as the great economy with which they operate. Another machine of great importance in boiler making is one recently patented by the senior partner for punching the rivet holes, the movements of which are entirely automatic. Other special machines for many of the operations in building locomotives, iron ships, railroad cars, the manufacture of fire-arms, etc., have been made by the firm in large numbers. For the past few years a heavy business has also been done in steam hammers. When this branch of business was commenced, it was not anticipated that it would become a very important one. Experience showed, however, that this kind of machinery afforded a field for improvement, and would repay careful attention. In fact, this department has outgrown the limits assigned to it, requiring a more extended space—which the firm are about to give it—for increased facilities of manufacture. The system of inspection applied to all the machinery turned out at these works is worthy of notice, and contributes essentially to the high character of its productions. An inspector thoroughly acquainted with all the details of the business, and furnished with the most accurate instruments that can be procured, is charged with the thorough examination of every machine made; that any defect, either in workmanship or material, may be carefully noted, reported, and rectified. This system the firm consider invaluable. During the year 1873, the Industrial Works employed about 450 men; consumed 1600 tons of coal, and 2600 tons of iron and steel; and shipped machinery to thirty-three of the States of the Union, as well as to Canada, Cuba, South America, and China.

WILLIAM BARNES BEMENT was born in Bradford, Merrimac county, New Hampshire, May 10th, 1817, and is the son of a farmer, who combined with that calling the trade of a smith. His education was obtained, during the winter months, at the district school; and at other times he assisted his father and brother in their several avocations. When seventeen years old he was apprenticed to the machine business, at Peterborough, New Hampshire, to serve three years; but at the expiration of two his progress had been such that he was taken into the firm, his brother purchasing an interest for him. From 1837 to 1839, he was engaged in making cotton and woollen machinery. In 1840, he removed to Manchester, New Hampshire, and while there was connected with the Amoskeag Machine Shops. In 1842, he went West to Mishawaka, Indiana, to superintend some woollen machinery shops, but just prior to his arrival there they had been destroyed by fire. He then took up gunsmithing as an expedient, and while following this calling was tendered the superintendency of the St. Joseph Iron Company's Machine Shops. Fire demolished these, but they were rebuilt, and he remained there for some time after, during which period he designed and constructed an engine lathe, himself making the necessary tools required in its production. He also constructed a gear-cutting machine, the first ever made in the West. In 1847, he returned East, and took contracts to build cotton and woollen machinery for the Lowell Machine Shops, and ultimately assumed the management of the designing and pattern departments. He remained at this point, with great acceptability to his employers, until his removal to Philadelphia. His subsequent business career is traced above. A comfortable competency is the result of his ability, energy, and enterprise, and this he spends in a manner calculated to advance the material and social position of the city. He is an ardent lover of the fine arts, and their generous and judicious patron, as the well-stored galleries of his residence amply testify. Among the treasures of art he has collected are not only masterpieces by foreign artists, but works indicating his appreciation of native talent, and his determination to foster it to the utmost. He is, and for some years has been, a Director of the School of Design for Women, and the Pennsylvania Academy of Fine Arts, contributing largely by his means, counsel, and active co-operation to the accomplishment of the many benefits those institutions are conferring upon the community, and to the maturing of more extended schemes of usefulness in connection with the erection of the new academy building, a structure that, in its size and adaptability to the purposes for which it is designed, has no rival on this side of the Atlantic. His residence — 1814 Spring Garden street—is the resort of lovers of art in its various delineations of the beautiful, and to them he extends a generous and elegant hospitality. Although in no sense a politician, he takes an active interest in public affairs, and always casts his influence in favor of movements designed to promote good government—local, State, and national. He was married, in the year 1840, to Emily Russell, a native of Royalton, Vermont.

Wm B. Bement

WILLIAM SELLERS & CO., Machine Tool Manufacturers, Philadelphia. This firm, so well and favorably known as makers of machine tools, steam hammers, shafting, mill gearing, turn-tables, and the Gifford Injector for supplying steam boilers with water, had its origin in 1848, under the name of Bancroft & Sellers, in that part of Philadelphia then known as the District of Kensington. Both partners were practical men, possessing a large inventive genius, and their great aim was to excel in their production of machinery, both in execution and originality. As the works became known, and their workmanship tested, business correspondingly increased, and as the shops proved to be too small, they removed, in 1853, to the large and commodious buildings which they had erected on the square bounded by Sixteenth and Seventeenth streets, and Pennsylvania avenue and Hamilton street. In 1855, the senior partner died, and the firm-name was changed to its present style, two brothers, William and John Sellers, Jr., being the only members of the new firm. In time, with a rapidly increasing business, the square occupied by their shops did not afford sufficient space, even though its buildings had been extended to the height of two and three stories. Fortunately, an adjoining square of ground to the north and three-fourths of a third block were secured, and suitable workshops and foundries erected, the foundry and pattern shop being first removed to the new sites. The former is 295 feet long and 80 feet wide, of unobstructed foundry floor; of this extended space, 200 feet is 33 feet high in the clear. A very perfect system of cranes, swinging over the part needed for heavy castings, is here provided. Two of these cranes can hoist fifty tons, others twenty-five tons, and a few of ten tons capacity each. The sand, which is used in moulding, is all prepared in rooms constructed for that purpose. The rooms for making cores, the core ovens, the cupola room, pattern shop, and room for storage of patterns, as well as rooms for cleaning castings, are adjoining the main foundry, the whole space under roof being 178 feet by 275, nearly one-half of this being two stories high. The coal vaults are under ground, and vaulted passages give access to the furnaces for heating the core ovens. In one of the underground vaults are the hydraulic engines for working the crane hoists. This foundry has been fitted up with special reference to the peculiar business, and every care is taken to make very superior castings, both as regards quality of material and smoothness of surface. The south square, being that first occupied by the firm, is now devoted entirely to machine shops and blacksmith shops. The main building, one story high, measures 80 by 369 feet. At one end of this large room, a space 80 feet square is roofed over 25 feet in the clear, while the remainder is 16 feet high under the beams. The windows are large, and the whole space is admirably lighted and well ventilated, while, in winter, all parts of their buildings are heated by steam. A three story fire-proof building, 110 feet long and 55 feet wide, gives space for turning shop and storerooms. In this building are also located the office and drawing room. Other buildings cover all the available space in the lot, and are used for the manufacture of specialties. The entire space occupied by the works is nearly three acres, in the heart of the city. A track from the Reading Railroad passes into the buildings, crossing Hamilton street, and enables the distribution of coal, lumber, and material to all needful parts; also furnishing a ready means of shipping machinery by rail. A noteworthy feature of the main machine shop is a railroad track, laid on heavy foundation walls, extending the entire length of the main building; this track, with convenient turn-tables at proper intervals, being a portion of the railroad system extending to the tracks of the Reading Railroad. The principal tools in the main room are set on cast-iron floor-plates, resting on foundation walls, while the part of the floor upon which the workmen stand is made of wood. This arrangement insures great solidity to the machines. Among machinists' tools made here may be mentioned the machine for cutting bolts. One of these was exhibited at the Paris Exposition, 1867, and attracted great attention. It is extensively used in England, and copied by many Continental makers. In April, 1864, William Sellers read a treatise on a *System of Screw Threads and Nuts*, before the Franklin Institute, of which he was at that time President. He recommended a system based upon formulæ, whereby, the diameter of the bolt being given, all proportions of threads, etc., could be calculated, also a change in the form of thread, making a flat top and bottom to the V thread of 60 degrees angle, equal to one-eighth of the pitch. The subject was referred to a committee consisting of and representing some of the best engineering talent of the Institute, and was by them finally adopted, and it has since received the sanction of the leading railroads and workshops. The United States Navy Department made it the subject of a special commission, and, in an exhaustive report, fully indorsed it, so that it is now regarded as the National standard. The bolt-cutting machine, with this new system of thread,

is fast finding its way into every well-arranged workshop. It has been recently very much improved by the addition of a self-opening mechanism to the dies, and a system of lubrication, that effectually washes out all chips from the dies. By means of this improvement, and other changes in this well-known tool, a much higher rate of speed has been obtained; and it may be noted that on the ¾-inch bolt-cutter, having only one die-head, 3600 ¾-inch bolts have been cut by one man in ten hours. Another important invention of Mr. Sellers, which speaks well for the originality of these works, is a planing machine used for planing metals. This important production has been long and thoroughly tested, and for durability, simplicity, and rapidity of operation, has been pronounced thoroughly successful. Other useful tools and machines, such as turning lathes, slotting machines, and drill presses of different kinds, are manufactured, and all of them are characterized by the same originality which distinguishes all of the other important and valuable productions of the establishment. The attention of the firm has been directed towards the production of machines which shall, with the least skill on the part of the workman, be able to produce the best work in the largest quantities. Many years ago, the late Mr. Bancroft invented the Ball and Socket Hanger, and since that time this establishment has improved its patterns to such an extent, that it has become one of the most necessary appointments in most of the large woollen and cotton factories of the country. In 1856, the present firm produced a coupling for uniting the various pieces of shafting, forming a line; it is now known as the double cone and vice coupling. They also determined to reduce the weight of shafting, as also that of the hangers, coupling, and pulleys; and after a long series of experiments, extending through many years, determined the exact proportion required to produce the best results, aiming at lightness, strength, and entire fitness for the uses to be served. They then introduced a "fixed scale of prices" for the various articles comprised under the name of "shafting," offering shafting at so much per foot; hangers, couplings, and pulleys at so much apiece. This was a bold innovation on the usages of machine shops, and at the same time a venturesome experiment. The result has been eminently satisfactory, the firm having received the greatest encouragement from the largest operators, while thousands of feet of shafting are being shipped to all parts of the country. The largest cotton and woollen mills in New England are now furnished or being supplied with this shafting. The *London Spectator*, of April 19th, 1867, in speaking of this firm at the Paris Exposition, says: "The manufacture of shafting, indeed, forms a very extensive and important part of their business, and is a just reward for their skill in this line of novel construction and good workmanship. Something is also due to the introduction of a scale of fixed prices for the various articles of this class, which, by other manufacturers, are invariably sold by weight, and nearly always made inconsistently heavy." This same journal speaks in the highest praise of Sellers & Co.'s other productions, and says that "We are ever ready to give just praise to works of originality, good design, and skill, by whomsoever produced, and we are rather proud of such rivals as these Americans than jealous." The productions of this firm have been extensively exhibited and practically used, not only in this country, but abroad. Their exhibit at the Paris Exposition was unusually large, and they received most flattering testimonials for their skill and originality, in the form of gold and silver medals, and diplomas from the International Jury, besides faithful acknowledgments from the prominent European journals. In 1873, another exhibition was made at Vienna, and the display at this time included, in addition to examples of machine tools, a train of rolls and mechanical puddler made at this establishment. The award of the jury at Vienna was proof of the appreciation of this exhibit, inasmuch as the grand diploma of honor, which was awarded to them, was not given for excellence of design, or ingenuity in invention, or superior workmanship only, but was designed to bear the character of a peculiar distinction for eminent merit in the domain of science and its application to the education of the people, and the advancement of the intellectual, social, and material welfare of man, and was awarded exclusively by the Council of Presidents upon the proposition of the International Jury. The translation of the exact words of the award is: "Sellers—For pre-eminent achievements in the invention and construction of machine tools, many of which have been adopted as patterns by the constructors of tools in other countries." The comments of the leading mechanical journals of Europe on this exhibit were flattering in the extreme. This firm was the first to manufacture the "Gifford Injector" to supply steam boilers with water, and they were the sole manufacturers of these instruments in the United States during the continuance of the original patent, introducing during that time many important improvements. They are now arranging for its more extended use, furnishing four different kinds of each size of in-

strument. Their attention has been directed of late to hydraulic machines for elevators and other hoisting machines; also to punches, shears and riveting machines for forging purposes. They have also designed many special tools adapted to the increasing industry of iron shipbuilding. Their improvements upon the lathe should be noted. Although this tool is perhaps older, and of more common and important use by the machinist, still there have been many and most important improvements made in it. It is a subject which has engrossed the attention of the firm, until their "Self-Acting Slide Lathe" has become one of the most prominent of the great labor-saving machines of the day. As the deficiencies of other special tools and machines are manifested, improvements of various kinds are studied and perfected. One of the most important of these is their gear-cutting machine; and the history of the different steps which this tool has passed is most interesting, illustrating what constant and determined study, coupled with practical experience, will accomplish. At first this machine had to be handled and moved from place to place by manual power. The improvement they have made obviates this necessity, and the same machine, by the present workings, will accomplish one and a half times as much as one man could perform, while one person can now easily attend to the operation of three or four machines, thus saving time, labor, and great expense. Another important improvement made at this establishment is in a machine for boring locomotive cylinders; and indeed much space might be occupied in relating what this firm has done towards the great development of the industries of the country. From the beginning of their business career they have proceeded on the plan of making all machines to fixed gauges, so as to make the same pieces of different machines interchangeable, and to facilitate renewal or repair of broken parts. At the beginning of the year 1873, the firm was increased by the admission of three new members, all of whom had been for many years in their employ, viz.: Coleman Sellers, J. Sellers Bancroft, and James C. Brooks. All of these gentlemen are perfectly familiar with their respective departments, and thoroughly competent, through long experience with the details, to conduct the establishment with the precision which characterizes it in all its parts. The name of Sellers is not only prominently associated with the history of Pennsylvania, but, in most instances, it is closely identified with her manufacturing interests. They were heard of as weavers in Delaware county as early as 1683, while the great-grandfather of William and John Sellers was a manufacturer of leather, and the grandfather of Coleman Sellers was a wire worker, who, during the Revolutionary War, turned his machinery into good account by rendering faithful service to his country. The father of William and John Sellers was also a miller in Delaware county.

WILLIAM SELLERS was born in Delaware county, Pennsylvania, in the year 1824, and acquired his early education at the common country school. Having a love for mechanics, he, at an early age, entered the machine shop of I. Morton Pool, of Wilmington, Delaware, where he faithfully served his time, and learned his trade. He then removed to Philadelphia, and established a small shop in this city. His industry and his good judgment were soon observed by many, and it was not long after he came here before he became associated with Mr. Bancroft; and until that gentleman's death, the firm was Bancroft & Sellers. William Sellers is widely known throughout this country and abroad as one of the inventive men of the day. Modest and unassuming in his manners, he gains the confidence of all around him. For a long time he was President of the Franklin Institute, and to him more than to any one else belongs the credit of placing the great establishment, of which he is the head, where it is to-day.

JOHN SELLERS, the second partner, was born in Delaware county, Pennsylvania, August, 1826. After receiving the education obtainable at the common school, he went to Cincinnati, and held a responsible position in a bank in that city. It was here he received that education which has since been of so great service to him as the head of the financial department of this establishment. He afterwards returned to Philadelphia, and was for a time engaged in making castings at a small establishment on Cherry street near Fourth or Fifth street. When the firm of Bancroft & Sellers was formed, he entered their works, where he has since remained, having the entire charge of the business matters.

COLEMAN SELLERS is another name widely and most favorably known to the scientific world. He was born January 28th, 1827, and educated at West Chester, Pennsylvania, at Mr. Bolmar's school, which in those days was one of some note. At the age of sixteen he went to work on a farm in Delaware county, at which occupation he continued three years, and then emigrated to Cincinnati, Ohio, and entered the rolling mill of George Escoll Sellers. Here he applied himself most assiduously

to his new vocation, being determined to understand his business in every respect. In three years he was appointed the superintendent of a rolling mill and wire works. A short time after he held a responsible position in the celebrated locomotive works of Niles & Co. In 1856, he came to Philadelphia, and accepted the position of Mechanical Engineer in the works of William Sellers & Co., and for nineteen years has been constantly engaged in this position. He has been a partner in the establishment for two years. He is one of the hardest students in this city, and has done an immense amount of good by his labors to elevate the mechanic, and to bring forward new improvements in the mechanical arts. He is at present the President of the Franklin Institute, having been honored with that position in five consecutive elections.

JUNCTION CAR WORKS AND FLUE MILL, W. C. Allison & Sons, Philadelphia. These industries, which are believed to be the largest private works in this country, if not in the world, owe their origin to but a very humble and unpretentious beginning. The senior partner, when but nineteen years of age, and alone, commenced wagon making, on Broad street near Vine, and succeeded so well that ere long he required an assistant, and as business prospered others were employed. After a few years, he associated a relative with him and greatly enlarged his operations. Having safely passed through the financial storm of 1837, although he made heavy sacrifices to preserve his credit untarnished, he soon recovered the lost ground and prospered again. At this time, 1840–'41, steam railways were in their infancy, but a demand for rolling stock was being created, and he turned his attention to car building. Having no blacksmith shop, he was obliged to depend upon a neighbor, who had already commenced furnishing iron work for cars, and fitting car wheels on axles. This was John Murphy, with whom he subsequently, in 1851, entered into partnership for the manufacture of cars, under the style of Murphy & Allison, and they together supplied not only the immediate wants of the times, but continued their operations, furnishing most of the work for the large transportation companies between Philadelphia and Pittsburgh, and for the West Chester as well as for the Germantown & Norristown Railroads; in fact, for many years they were the only car builders within the State of Pennsylvania. Upon the completion of the Pennsylvania Railroad, and the alteration of the State road, by which the terminus was removed to Market street, the firm erected their shops on Market street, west of Nineteenth, filled them with the most perfect machinery then attainable, and continued at that locality, prospering continually, and increasing constantly their capacity for manufacturing cars of every description. It was here that the first really comfortable passenger cars were constructed; and here also was the first sleeping-car built. They also enlarged their line of business by entering into the manufacture of cars for the city passenger railways, and erected, among others, a large and commodious paint shop expressly to accommodate this new feature. During this period the firm became the proprietors of the property known as the "Girard Tube Works," on the Schuylkill, at Filbert street wharf; and now added the manufacture of butt-welded gas and steam pipes to their other business, and met with brilliant success. This was at that time only the third establishment of the kind in the country, and the works were taxed to their utmost. In May, 1863, their car works at Market and Nineteenth streets were destroyed by fire; entailing a heavy loss upon the firm, as they had on hand an immense stock of material, and had large contracts with the Government and with the principal railroads, which they could not in consequence fulfil. The excellence of their work had attracted universal attention, and the first palace car, built for the President's use, was truly palatial, but was destroyed in this fire. The firm at once resumed operations, filled what orders they could—at heavy loss to themselves—leasing the large buildings in West Philadelphia, belonging to the Architectural Iron Works Company, at Thirty-first and Locust streets, and within two months they were again building cars. About this time they purchased the property and located their present works. This was during the dark days of the Rebellion, when the prospect was far from bright, but they persevered, erected their own shops, and in 1864 occupied the new works, which even then were conceded to be the largest and finest in the land, having the capacity of producing two large passenger coaches, six city passenger cars and thirty-five freight cars per week. In 1866, the firm discontinued the building of passenger cars, and turned their attention to a new branch of trade—the making of lap-welded iron tubing for boiler flues and oil well purposes, the demand for which had now become immense. The amount of business done by them in this line was very great, particularly in the oil regions, where the Allison tubing has gained the highest reputation. The

completion of the necessary arrangements, the building of immense shops and the fitting up of ingenious and intricate machinery for the new business, required nearly a year to complete; in the meantime, the firm was dissolved by the death of Mr. Murphy, leaving a void not easily filled. Mr. Allison, however, had two sons, J. W. and T. E. Allison, who had been for many years connected with their father's establishment in various ways, and these were now promoted to partnership with him, forming the present firm of W. C. Allison & Sons. The new firm largely increased their buildings and operations, and after a season of prosperity were again the victims of fire, which, on July 25th, 1872, destroyed nearly the entire establishment, with its acres of buildings. To give some idea of the magnitude of the disaster, it may be stated that $300,000 of insurance was far from covering the actual loss sustained, without regard to the incalculable damage arising from the interruption to their trade. Undaunted, however, by the ruin and desolation around them, they took possession temporarily of their old quarters, at Thirty-first and Locust streets, and with imperfect facilities managed to keep up their manufactures. Meanwhile, they rebuilt their works, erecting new, more complete and substantial buildings, all the imperfections of the former structures being removed and new improvements added. On May 1st, 1873, they re-occupied their own works and made a new departure in the routine of their business on a more extended scale than ever before. Over 1500 men are now employed, and the works are capable of producing a train of twenty freight cars per day. About fourteen acres of ground in all are occupied by the firm, and more than seven acres of this territory are covered with roofed buildings, all substantially and thoroughly constructed, and one, two and three stories in height. The works have a frontage on Chestnut street, between Thirty-first and Thirty-second streets, and extend back to Spruce street on the south, and to the Schuylkill river on the east, where a large wharf frontage with piers is found. Railway tracks traverse the works in every direction, their length being between three and four miles, and a locomotive engine, owned and worked exclusively by the firm, operates on these branches daily in shifting about the cars of iron and lumber arriving, and the trains of new cars departing. The stationary steam power employed aggregates over 700 horse, and to operate the hundreds of machines used, over five miles of belting is required. Since rebuilding these works, the firm have the facilities of manufacturing to the extent of between five and six millions of dollars per annum, while previous to the last fire the business only footed up half this amount. The quantity of material used per annum, when the works are running to their average capacity, is enormous, of which may be specified, 20,000,000 feet of lumber, 17,000 tons of wrought iron, 8000 tons of cast iron, 400,000 pounds of brass, 675,000 feet of tin, 85,000 gallons of oil, 20,000 axles, 40,000 wheels, 1500 tons of bolts, nuts and washers and 5000 kegs of nails, and an equally large quantity of manufacturing supplies and material of a varied character. The system of conducting the vast establishment is a most perfect one. There are eighteen separate and distinct departments, each having an experienced and responsible head, with his own office assigned him, with a separate accountant; in fact, there are eighteen distinct kinds of manufacturing carried on, each having checks upon the other. On the Chestnut street front is a lumber yard, 150 feet front, where the rough lumber, chiefly oak, is received. Thence it is taken to the wood working and saw mills adjoining, two in number; one of these measures 50 feet by 480 feet, and the other 50 feet by 220 feet. These shops are provided with planers, boring machines, saw tables, etc., of the most approved kind, and convert the logs into the timber from which the freight car is to be framed. About 175 men are constantly engaged in these buildings. The wood work is removed on small truck cars, of which eighty-six are used in the works, and by a net-work system of railways, turntables and transfer tables is conveyed to any desired point without further handling. The truck shop and repair shop are each 50 feet by 250 feet, and employ 60 men. The machine shop measures 100 feet by 140 feet, where there are over 100 men constantly at work; it is filled with punches, shears, iron-planes and other machinery used in iron working. The engine, boiler and store room houses adjoin, in which from 30 to 40 men are engaged. The pattern shop is two stories high and of 40 by 60 feet dimensions. The smith shop is 200 feet long and 100 feet broad, containing 70 forges, all standing back to back, with a coal tressle beside them, and on the other side a railway track to remove the iron in cars. The erecting shop is triangular, and covers nearly two acres of ground. Here the cars are put together, painted, finished and turned out to the extent of one or two trains per day. It is all under one roof, and has over 200 skylights. Within it are 13 tracks, diverging from a main track, and having a total capacity for 84 eight-wheeled cars. Over 200 men are here employed. The office is a handsome three

story brick edifice, elegantly fitted throughout, and is in communication, by telegraph, with any distant point. To the east of this building are located the spacious structures used for the manufacture of iron tubing, already referred to. The furnace department, containing nine furnaces and much ponderous machinery, is in an extensive building, 153 feet by 385, and where 400 men are employed night and day. Here all the rough and heavy work is performed and the tubes formed. The next stage is the pipe-cutting shop, which measures 375 feet by 82 feet, and where the tubes are cut, threaded and fitted, and finally, undergoing a hydrostatic test of 1200 pounds to the square inch, are removed to the store room, which is 75 feet by 180 feet, whence they are loaded into cars upon a railway track within the buildings and removed for shipment direct. The quantity of tubing manufactured annually by the firm amounts to over $1,250,000, and the works rank as the second largest, in this particular branch, in the United States. As the reputation of their make is increasing daily, their orders are correspondingly increased as time rolls on. In addition to all these manufactures, the firm, in 1874, extended their sphere of operations very materially. They built a large wharf on the west side of the Schuylkill river, above the South street bridge, capable of accommodating four vessels and several canal boats, all of which can be loaded or unloaded at the same time. There are two steam cranes upon the wharf, one of which can raise seventy-five tons at one time, and the other has a capacity for fifteen tons. There is also a small horse power crane and tackle for canal boat and other light service. Railway tracks extend from this point to Thirty-second and Chestnut streets, and afford great facilities for economically loading and unloading all kinds of merchandise into or from the cars, and easy access to wagons, trucks, etc. These cars are propelled by the firm's own locomotive; and the railway connections are such as to enable the firm to receive or deliver to any railroad entering Philadelphia. The firm are also prepared to contract for the delivery of merchandise in their own cars, used for the purpose, to any part of the city; and having also the best railroad track, cart and platform scales, can accurately weigh every description of goods. So also are they able to contract for planing, sawing and working all kinds of lumber, by the car load or cargo, and executing different articles of iron work, forgings, etc.; and can undertake and execute promptly all lines of bridge work, and also builders' and contractors' framing job work.

WILLIAM C. ALLISON was born, 1817, in Chester county, Pennsylvania, and is of Quaker parentage. His early education was obtained in a village school, in winter sessions; but, when old enough, those having the guardianship of him apprenticed him to a wheelwright; and during his leisure hours, while learning his trade, he passed the time at the night school or in the village lyceum, seeking instruction in what he considered himself deficient. Having served out his apprenticeship, he continued to work at his trade as a journeyman, and soon acquired a small amount of money, with which he proceeded to Philadelphia and sought employment there. This he obtained, and was promoted as rapidly as his own ambition could have desired; but he wished to exercise his mechanical ingenuity as his own master; so at nineteen years of age he entered into business on his own account, and the result of untiring industry, energy, perseverance under unforeseen difficulties, is given above; and if there be a single self-made man, in the literal sense of the word, that man is the senior member of the firm of W. C. Allison & Sons.

WILLIAM CRAMP & SONS' SHIP AND ENGINE BUILDING COMPANY, Philadelphia. These works were established as early as 1830, and the present senior partner was engaged in wooden ship and steamboat building until 1860, when the business of producing iron ships was engaged in to the exclusion of wooden work, and has since been steadily continued. From the commencement until 1857, William Cramp conducted the business alone; in the last-named year he admitted his sons, Charles H. and William M., into a firm styled as at present, and again, in 1863, three other sons, Samuel H., Jacob C. and Theodore, became partners, the name of the firm remaining unchanged. Each of the sons learned the trade in the yard. These works were of signal service to the Government during the war of the Rebellion, having constructed the "New Ironsides" frigate and a number of iron-clads, which were built at a time when neither the resources of the navy yards nor the progress of iron ship-building afforded the facilities or knowledge of naval architecture commensurate with the task. During the entire war, a large force of men were actively engaged in the building of iron vessels, thus preparing the firm to accept the large contract of building four mammoth iron ships for the American Steamship Company.

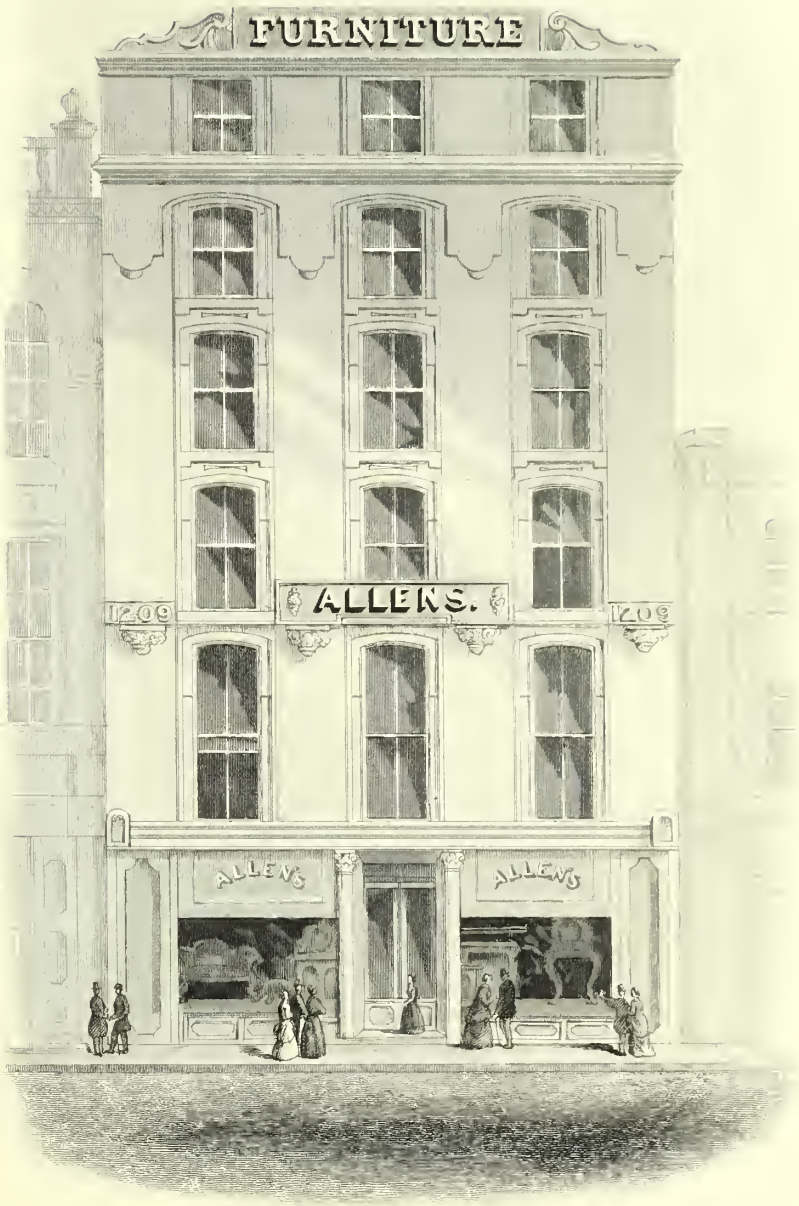
For this purpose a new yard was necessary; and a large tract of land was procured. A sufficient force of men was set to work, and in less than three months this land was rendered in every way suitable for the construction of these vessels. Thousands of piles were driven, and suitable buildings erected for the furnaces, machine shops and machinery; shops used for forging the ribs and beams, and punching holes without number, shearing, bending, etc., were all built within that space of time. In August, 1872, the first of these ships—the "Pennsylvania"—was launched; in the following October, the "Ohio;" in March, 1873, the "Indiana," and two months later, in May, the "Illinois" followed her consorts to their future element. When the contract to build these vessels was taken, American iron ruled low in consequence of heavy importations, and the prices for material upon which the contract was based were at least 30 per cent. below what the iron actually cost subsequently. It is to the credit of the firm, however, that the work was completed to the letter of the contract and in the time specified. These ships have made better average time in their passages than the foreign lines, and have thus far carried full cargoes of freight and passengers, without damage or accident, and are commercially as well as mechanically a success. Each of these ships is 355 feet long, 43 feet beam, depth, 34½ feet, and of tonnage (old measurement), 3,016. The capacity of the coal bunkers is 720 tons. For a cargo of compressed cotton, at 30 cubic feet per bale, 5141 bales; for measurement goods, at 40 cubic feet per ton, 3854 tons. Draught in fresh water, with coal bunkers full and a dead weight cargo of 1740 tons, or measurement of cargo of 3854 tons, also a full complement of saloon and steerage passengers, officers and crew, and all necessary stores on board, 20½ feet. The amount of iron tonnage built by the firm in 1872 and 1873 was 24,800 tons, which represented an approximate consumption of plate and other irons used in the work of 7750 tons. During 1873, in addition to the last ships of the American line, there were six iron steam colliers built for the Reading Railroad Company, each 250 feet long and of 1660 tons capacity; they also completed and delivered, in 1874, the "Columbus," the largest iron steamer for the coastwise trade yet built in this country; she is an iron screw ship of 1850 tons, 285 feet long, brig-rigged, with wire standing rigging, and now plies between New York and Havana. Her appointments are most luxurious, and she has become a favorite in the trade. During the excitement consequent upon the threatened war with Spain, in the fall of 1873, several iron-clads were sent to these works by the Navy Department, and refitted for sea. The establishment is completely and thoroughly equipped with the best machinery, and the firm possesses all the advantages of experience, practical acquaintance with the trade and indomitable energy. The usual working force is 1200 men, although 3000 hands have been employed when the increased force was necessary.

WILLIAM CRAMP was born in the district of Kensington, now the Eighteenth Ward of the city of Philadelphia, in 1806, and when fifteen years old was apprenticed to learn the business of a ship-carpenter. After he had completed his term of service, he worked for several years as a journeyman and until he entered into business on his own account.

EAGLE COTTON MILLS COMPANY, Allegheny City: President, O. M. Harper; Treasurer, Robert B. Townsend. This company was organized April 27th, 1867, under the General Manufacturing Laws of Pennsylvania. It is managed by a board of five directors, of whom the President is one, and a treasurer. The first President was Joshua Rhodes, who served as such until July, 1867; he was succeeded by Captain C. W. Batchelor, who continued in that position until January, 1874, when he resigned. The present management consists of O. M. Harper, President; C. W. Batchelor, J. H. Dalzell, J. W. Cook and Ralph Bagaley, Directors; with Robert B. Townsend, Treasurer. Joel Smith, Jr., has been the Superintendent since the organization of the company. The principal factory is located on Sandusky, Isabella and Robinson streets, Allegheny City, near the margin of the Allegheny river, and consists of a number of brick buildings, the first of which was erected in 1832, by Arbuckles & Avery, and was operated as a cotton yarn mill. That firm, by their skilful manufacturing, acquired a celebrity for their yarns above any other brand on the Western market, where, at that period and for a long time afterwards, this article of merchandise was very extensively used in domestic manufactures, as warps for jeans, blankets and satinets. The Eagle Mill has always sustained the first position on the market, and received the highest prices for these goods. During the first year of the present company's existence, operations were confined to this site alone—the Eagle Mill—in which 140 looms were devoted to the production of sheetings, in addition to the

machinery employed on the specialties of yarns, carpet warps, twines and wicks. Additional looms were shortly afterwards introduced, and the number increased to 220, with auxiliary machinery of new and improved pattern. The Eagle Mill now contains 84 sets of cards, 9700 spindles (beside twister and spooler spindles), 6 dressers and 220 looms, together with a complete machine shop for repairs, a commodious warehouse, fine office building and superintendent's residence on the grounds, which cover an area of nearly one acre, the dimensions being 217 feet by 197 feet. In January, 1872, the company purchased the property known as the Banner Mills, formerly owned by Park, Painter & Co., and fronting on Main, Sycamore and Canal streets, in the same city, with a commodious cotton house attached The area of ground measures 163 feet by 100 feet, besides the lot on which the warehouse is built, which is of the dimensions of 25 feet by 116 feet. This mill contains 63 cards, 26 spinning-frames, 8 twisters, 92 sheeting looms and 32 bag looms, besides machinery for other specialties and a fine repair shop. Both mills are operated by Corliss steam engines; that in the Eagle Mill has a 26 inch cylinder and 4 feet stroke; the other, in the Banner Mill, has a cylinder of 23 inches and 4 feet stroke of piston. In the latter mill, the company manufacture sheetings, bags, twines, carpet warps, and hosiery yarns. All the goods of these two factories are placed on the market as the product of the Eagle corporation, and are very favorably known both in the East and West. The goods are sold by agents of the company in Cincinnati, Louisville, Chicago, and St. Louis, whilst other cities are supplied direct from the mills. The weekly consumption of cotton by the two factories is 100 bales, of which the Eagle takes sixty and the Banner forty. The cash value of the annual products, of course, varies with the price of the raw material, but the average amount is about $600,000. The capital of the company is $300,000, all of which is paid.

ALLEN'S FURNITURE AND UPHOLSTERY WAREROOMS AND CABINET MANUFACTORY, Philadelphia. This, the leading business of its kind in Pennsylvania, and one of the most important of its class in the United States, was founded in 1835, by Joseph and William Allen, Jr. Their father had for some years carried on a small business, but not very successfully, and his two eldest sons, before they were out of their teens, took charge of it and laid the foundation of its present prosperous condition. They had a capital of $800, and their store was located on Spruce street. From thence they moved to Second street. Here they worked and prospered for many years, the reputation of their manufactures increasing daily. In 1860, they commenced the erection of their present fine establishment at 1209 Chestnut street—a model of its kind, built expressly for their business. It has a front of 22 and a depth of 150 feet, and is six stories in height. It was supplied with every convenience, and was built at a most propitious season and under the most favorable circumstances. They occupied it in 1861, and about the same time a younger brother, James C. Allen, was admitted as a partner in the business. At the outbreak of the war, they, in common with many other Philadelphia firms, met with some heavy losses, but were fully enabled to preserve their credit. Indeed, they have always pursued a strictly cash system in both buying and selling, and upon the fifteenth of each month pay every dollar of their indebtedness. In 1865, William Allen, Jr., died, and Joseph and James became the sole proprietors. The former has always superintended the manufactures, while the latter has charge of the warerooms and upholstery department on Chestnut street. The manufactory is at Twelfth and Willow streets, and is a building 60 feet square, with a kiln-drying establishment in the rear. From here the rough work is carried to the store, hoisted to the upholstering department, finished, and then placed in the warerooms. All the work is hand-made, and of the most elaborate designs, no machinery being used. The greatest care is taken in the seasoning of their hard woods, of which an immense stock is kept on hand. It is put through various processes before it is submitted to the delicate manipulation of the carvers, and from two to five years, according to thickness, is the time required to season it. The most skilled workmen to be obtained in Europe or America are employed, and they are of various nationalities. A thoroughly competent workman has charge of the veneering department, under the supervision of the senior partner. It has special features not found in any other establishment. The temperature of this department is never less than 70 degrees, for even a moderately cool atmosphere would prevent the glue used from being absorbed by the wood. The greatest care is exercised with regard to temperature in all the departments of the building. In fact, strict regard for what would seem to be matters of trifling moment with most manufacturers is a characteristic of the establishment. But the adding together of these seeming trifles sums up



Gidney Pub. Co. Philadelphia

Allens Furniture Warehouse, Philadelphia

one of the principal reasons why the work turned out has so great a reputation for durability and beauty of finish. In the latter particular they are unrivalled. Their work comprises everything in the house-furnishing line, from a foot-stool to ponderous and elaborately-carved folding doors. In decorative work they are unexcelled, and the sumptuous elegance of the residences of many of our wealthiest citizens are abundant evidence of this. Their work is strictly of the custom class, and they have but one price—that decided upon in their first estimate. Their reputation was founded by their superior work, and they never undertake to do "cheap"—or, in other words, inferior—work. Their workmen are of the most skilled and best paid, and in busy times they employ about 115 in the various departments of their manufactures. On the 1st of January, 1875, there was on hand at the manufactory 300,000 feet of hard woods, in the various stages of seasoning. They do custom work in all the States of the Union, and to some extent import their goods to Europe. The firm of Allen Bros. was awarded the first medal of the Franklin Institute, in 1874, but it was not the first recognition they had received at the hands of that society.

JOSEPH ALLEN was born on the 21st of March, 1818, at Birmingham, England. In 1828, his parents came with their family to this country, and eventually settled in Philadelphia. The father was a cabinet-maker by trade, and had carried on the business of this manufacture in his native country. His three sons, of whom Joseph was the second, were all brought up to the same calling. Joseph Allen designs all the elaborate work turned out by the establishment, and devotes all his time to the manufactory. He makes his business an art in the true sense of the word, and is thoroughly interested in all that belongs to it. He has a rare collection of old books pertaining directly and indirectly to his business, and, as most of them are out of print, he values them above price. Many of our architects have found them valuable works of reference. He is a member of the St. George Society, of Philadelphia. He is liberal with his means to charitable objects, but studiously avoids being conspicuous in his donations.

JAMES C. ALLEN was born, in 1825, at Birmingham, England. He was educated for business, and learned the trade of cabinet-maker with his elder brothers. On coming of age he was made foreman of the manufactory. He held this position for many years, and was then transferred to the sales department. Eventually he was given an interest in the business, and now has charge of the warerooms at 1209 Chestnut street. He is a gentleman of pleasing address, popular in social and business circles, and is liberal in charities according to his means.

BURGIN & SONS, Glass Manufacturers, Philadelphia. The founder of this firm was Dr. George H. Burgin, Sr., who established a glass-works, in 1815, at Millville, New Jersey, and operated the same successfully until 1837, when he disposed of the establishment, and inaugurated an enterprise of the same description in the then District of Kensington, now the Eighteenth Ward of Philadelphia. The firm as originally constituted was known as Burgin, Wood & Piersol; and after the death of Mr. Wood, and the subsequent withdrawal, in 1844, of the junior member of the firm, Dr. Burgin remained sole proprietor, and he thereupon associated with him, in the same year, his eldest son, George H. Burgin, Jr., who supplied the place vacated by Mr. Piersol, the firm assuming the name of Burgin & Sons, preparatory to the association of the present members. In 1848, Charles F. Burgin became a partner, and during 1857, both John H. and William, two other brothers, were added to the house, associating their interests with their elder brothers; and, at this time also, the senior member of the firm withdrew from all active employment. Subsequently, George H. Burgin, Jr., died, and the remaining brothers continue the business, and each has his proper department; John H. superintending the establishment in Kensington; William M. has charge of the financial portion of the concern; while Charles F. has the care of the mercantile arrangements. This firm occupy the entire building, No. 133 Arch street, which is crowded with their manufactures of flint, green and colored glassware. The premises are 20 feet front, a depth of 107 feet, five stories in height, besides the basement. On the first floor are the offices and salesroom; a portion of their wares are shipped from this store, although the bulk of the goods disposed of are packed and shipped from the works direct. The storage of glassware occupies both establishments. The works are located at No. 523 East Girard avenue, and cover over a half block of ground. As they are heavy manufacturers of glassware, it may be of interest to state the consumption of material they employ in the production of their goods: 1500 tons of sand, 300 tons of soda ash, 300 tons of pot clay for making crucibles, 3200 bushels of lime, and 200 tons of salt hay for packing. In addition to their furnaces for the manufacture

of black and green glassware, they have one devoted exclusively to the manufacture of what they designate as "German Flint Glass," sometimes termed "Philadelphia Flint Glass," which, though not so beautiful as flint glass containing lead, is preferable to it for many purposes, particularly for holding acids and alkalies, as the vessels are not affected by the contents. It is a very strong variety of glass, and is much used by chemists, apothecaries, and perfumers, as it can be colored, moulded and pressed into all the various patterns and forms of flint glass, and is sold at a far less rate than ordinary flint glass. This house also makes a specialty of manufacturing bottles, etc., according to the private moulds of individuals who prepare patent medicines, etc., their trade embracing the entire limits of the country, but principally Eastern, Southern and contiguous States. Bottles of all descriptions for druggists and perfumers form the bulk of their extended trade, but all descriptions of vials, etc., are made at their establishment. They use Siemen's Gas Furnace, and manufacture their own gas to feed it, using 2000 tons of coal and 1000 cords of wood annually. They employ, on an average, 250 workmen, who are skilful and thoroughly competent to perform the labor required of them; and each employé receives for his labor a just equivalent in money, not being obliged to accept his pay in store goods, as is the case with a majority of hands in some glass factories.

GEORGE H. BURGIN, Sr., M. D., the founder of the firm, was born at Bridgeton, New Jersey, and was the grandson of the first white woman born in that State. He removed to Philadelphia in 1812, where he embarked in business as a wholesale druggist, continuing therein for a number of years, meanwhile operating his glass works at Millville, New Jersey, and subsequently in Philadelphia. He was one of the leaders of the old Whig party, and, though not a politician in the modern signification of the word, he was for a long period a member of City Councils, and, in the early days of the Gas Trust, President of the Board. His sons, George H., Jr., and John H. Burgin, were both educated at the University of Pennsylvania, graduating therefrom with the degree of Doctor of Medicine; and Charles F. Burgin, another of his sons, is a graduate of the Collegiate Department of the same institution, and thereafter studied law, was admitted to the bar, and successfully practised his profession for a number of years. All his sons paid particular attention to chemistry, especially as applied to the arts, this science being so necessary to the successful prosecution of their business.

PORT RICHMOND IRON WORKS, I. P. Morris & Co., Philadelphia. The pioneers of this firm were Levi, Isaac P., and Joseph P. Morris. They commenced business, in 1828, at the corner of Market street and Schuylkill Seventh (now Sixteenth) street, under the firm-name of Levi Morris & Co. Joseph P. Morris retired from the firm at an early date in its history. In 1834, the Messrs. Morris associated with them Lewis Taws, who assumed and continued to have charge of the mechanical department until his death, in December, 1871. Levi Morris retired in 1841, and the style of the firm was changed to its present name, I. P. Morris & Co. Finding the space occupied by them too limited for the constantly increasing demands of their business, they secured, in 1844, the present site of the works, and erected such buildings as were suitable for their requirements, which have been added to from time to time as the operations of the firm demanded. In 1847, John J. Thompson was admitted into the firm, the style remaining unchanged. In 1862, John H. Towne was associated with them, and the style of the house became I. P. Morris, Towne & Co., and so remained until 1868, when the firm was dissolved, Mr. Towne having disposed of his interest to the remaining partners. The firm then resumed the old style—I. P. Morris & Co.—which it still retains. Early in 1869, Mr. Morris died, and was succeeded by his two sons, James T. and John T. Morris. The site of the present works is on the right bank of the Delaware river, adjoining the Reading Railroad coal wharves on the south. The buildings, which are of brick, occupy a lot of about five acres, having a river frontage of 145 feet, a front on Richmond street of 260 feet, and an entire depth or length from the Richmond street front to the end of the wharves of nearly the fourth of a mile. The buildings comprise offices, foundry, machine shops, boiler and smith shops, pattern and core shops, erecting shop and engine rooms, together with the necessary appurtenances and outbuildings thereto. The office building, fronting on Richmond street, about midway between Ball and York streets, is used for offices, drawing, and designing rooms. It is two stories high, fire-proof throughout, and is 51 by 46 feet. It is surmounted by a large tower, which, combining utility with ornament, is used as a reservoir for holding water to supply the works. The tank will hold 13,000 gallons, and is fed from the river by a pumping engine, having the capacity of filling it, at high tide, in half an hour. To the left of the offices, with a front of 33 feet on Richmond street, and 75 feet on York street, is a building used for mixing

and preparing sand, and making and storing cores. A small caloric engine furnishes the necessary motive power. Adjoining this building, on York street, with a front of 150 feet, and a depth of 129 feet, is the main foundry, which is especially remarkable for the mammoth proportions of its appurtenances. It contains one cupola which melts twelve tons per hour, another six, beside smaller ones. Cranes of a capacity of corresponding magnitude sweep the floor in every direction, for lifting and adjusting the patterns, cores, castings, etc. The heaviest class of castings are made here, these being a specialty of the establishment. Opening out of the main foundry to the right is the brass foundry for making the smaller class of castings required. The large brass castings requiring the use of cranes are made in the main foundry. The blast for the cupolas is supplied by two direct-acting blowing engines (made by the firm), located to the rear of the brass foundry. This room likewise contains a complete fire apparatus, with hose attached, ready at all times for instant use; also a small engine for elevating coal, iron, etc., to the cupolas. Adjoining the foundry on York street, with a front of 229 feet and a depth of 60 feet, is the machine shop. It is a two-story building, the ground floor being used for finishing large, and the second smaller work. In addition to the smaller machinery similar to that found in most machine shops, are some machines and tools remarkable for their great size and capacity. For instance, a vertical boring mill, which has a turning capacity of 16 feet 7 inches diameter, and boring of 17 feet long. Also an immense lathe, which will finish work 34 feet long, and can, by shifting shears, be made to turn work 12 feet in diameter. There is also a planer which will plane work 33 feet long, 8½ feet wide, and of any desired height. All these machines, except the planers, were fabricated at these works. The Universal Radial Drill Press (by William Sellers & Co.) is capable of drilling in every possible direction within its reach—a great convenience with some class of heavy machine work—avoiding the necessity of shifting the masses to accommodate the tool. There were only two of these made, the mate to this being purchased by the Russian Government. A boiler shop 80 by 51 feet, and a smith shop 125 by 51 feet, complete the buildings on the York street side. Another boiler shop, 177 by 43 feet, is on the lower side of the pier. A two-story pattern and erecting shop, 206 by 50 feet, with an extension of 109 feet, erected in 1874, is the main building, worthy of note, which fronts on Ball street. The machinery and tools in the boiler and smith shops are of size and capacity fitted to the nature of the work. In a side room of the smith shop is the pumping engine, used for supplying the water to the reservoir. To the rear of all these buildings, a wharf 700 feet long extends into the river. It is furnished with a pair of shears for raising and lowering boilers, etc., into boats, and has swung 100,000 pounds weight at a time. The articles manufactured by this firm are many and varied in their character. They build steam engines of every description; their specialties, however, are blowing and pumping engines of large size, and many of the finest blast engines for iron furnaces in the country have been constructed here. The establishment is celebrated for the thorough excellence of its make, and has a high reputation for the quality of its products. Water-works machinery, as well as other heavy machinery of all descriptions, is manufactured by this firm. Among the many stupendous engines built at this establishment, a few—most of which have obtained a great notoriety—may be mentioned. Such are the blowing engines for the Lackawanna Iron & Coal Company, at Scranton, Pennsylvania; for the Crane Iron Company, at Catasauqua, Pennsylvania; for the Thomas Iron Company, at Hockendauqua, Pennsylvania; the last one, for the latter (the third of the same class furnished the company), being of the lever beam condensing kind, having a steam cylinder 66 inches in diameter, 10-foot stroke, and a blowing cylinder 108 inches in diameter, 10-foot stroke; two fly wheels 27 feet in diameter. The beam, which weighs about 40 tons, is supported on a cast-iron column 33 feet high. This engine is calculated to give a blast of 12 pounds per square inch. Of their late engines the most remarkable are the pair built for the Franklin Iron Company, of Franklin, New Jersey, which have 54-inch steam cylinder, 84-inch blast cylinder, and 9-foot stroke of piston. Of the vertical style, the most noticeable of the very many they have constructed are those built for the Andover Iron Company, of Phillipsburg, New Jersey, and the Carbon Iron Company, of Parryville, Pennsylvania, the former having 60-inch steam cylinder, 108-inch blowing cylinder, 9-foot stroke of piston; and the latter 52-inch steam cylinder, 96-foot blowing cylinder, and 7-foot stroke of piston. Also the engines lately started at the Glendon Iron Company, of Easton, Pennsylvania, and the Musconetcong Iron Company, of Stanhope, New Jersey. In 1864, they furnished the engines for the double-turreted iron-clads "Monadnock" and "Agamenticus," from their own designs, under the patent of Captain Ericsson. The performance of the former, at Fort Fisher, elicited high praise from Admiral Porter.

The voyage to Havana, and subsequently around Cape Horn to San Francisco, proved to the world the efficiency of this class of vessel for ocean service, and rendered her name historical. They also furnished the engines for the Government vessels "Antietam" and "Pushmataha" (now the "Cambridge"); the gunboats "Itasca" and "Sciota;" the monitors "Lehigh" and "Sangamon," and the double-ender steamer "Tacony." A few years since they built and erected in their yard an iron light-house, destined for the Gulf of Mexico, 107½ feet high to focal plain, and 122 feet to top of spire. It was to be erected twelve miles from land, in fifteen feet water. The Cornish bull pumping engines for the Buffalo Water Works, each having steam cylinders 50 inches diameter and 10-foot stroke; the lever-beam Cornish pumping engine, steam cylinder 60 inches in diameter and 10-foot stroke, for the Schuylkill Water Works; the Bull Cornish pumping engine, cylinder 40 inches diameter, 8-foot stroke, for the Camden, New Jersey, Water Works, were all constructed at these works. In 1873, they completed for the city of Lynn, Massachusetts, a compound beam pumping engine of entirely new design, under a patent of E. D. Leavett, Jr., the most noticeable feature of which is the angular arrangement of the cylinders, which are placed under the beam centre and incline outwardly. It has given remarkable results, both for the duty performed and the low cost of doing the same. After running for the whole of the year 1874, the average cost of pumping 1,000,000 gallons one foot high was found to be the astonishingly low figure of only 7 16-100ths cents. They have now (February, 1875) almost completed a pair of the same style, but of larger size, for the Lawrence, Massachusetts, Water Works. It will be observed that this firm have built the largest engines ever constructed for making iron with anthracite coal. The construction of engines for rolling mills, sugar mills, saw mills, etc., has been a large and lucrative branch of their business. One of the chief characteristics of this firm has been the steady step with which it has kept pace with the rapid march of progress during the whole period of its existence. To this, and the perfect system—as regular as the machinery they construct—which pervades everything connected with these works, are attributed much of the success of the firm.

ISAAC P. MORRIS, one of the founders of the firm, was born July 24th, 1803. While quite a lad he was apprenticed to Elizabeth Marshall to learn the drug and apothecary business, and after the expiration of his indentures, and in connection with the late Charles Ellis, who had also been his fellow-apprentice in the same concern, purchased the fixtures and good-will of the establishment, then located at (old No.) 56 Chestnut street, between Second and Third streets. Thus, at the early age of twenty-one years, he was a member of the firm of Ellis & Morris, the predecessors of the well-known house of Charles Ellis & Co. His attention, however, being early drawn to a mechanical business, he relinquished his former vocation, and joined his cousin Levi, and his brother Joseph P., in the firm of Levi Morris & Co., as previously stated. In the management of the affairs of this, as well as of the succeeding firms, he brought to bear with great effect a shrewd, sound judgment and untiring industry. During the later years of his life, impaired health prevented the active personal attention he had been wont to give to the affairs of the firm; but his interest in its operations was unabated, notwithstanding the suffering of a long illness. He died early in 1869.

LEWIS TAWS, the late engineering partner, had an ample training in the best of schools. He served his apprenticeship with Rush & Muhlenberg, sons-in-law and successors to the celebrated Oliver Evans. After attaining his majority, he spent a number of years in some of the leading engine-building establishments of New York; among these was the West Point Foundry Association, then under the superintendence of Adam Hall, a distinguished Scotch engineer. The present arrangement of the Port Richmond Iron Works is the result of his experience. Leaving New York, he went South, and passed some time in the Southern States acquainting himself with the wants of the leading branches of business to which machinery was applicable. Thence he proceeded to Porto Rico, where he devoted a few more years to becoming conversant with the process of manufacturing sugar, thoroughly familiarizing himself with the class of machinery in use, and devising improvements upon it. This store of information, added to his practical experience, eminently fitted him for the important and responsible position he was destined to fill—the mechanical engineer and partner of one of the greatest iron manufactories in the United States. He died in December, 1871.

JAMES T. MORRIS, son of I. P. Morris, was born in Philadelphia, in 1842. He was liberally educated, and upon leaving college entered the drawing and designing department of the Port Richmond Iron Works. Here he displayed great taste and rare mechanical talents. In the midst of

his usefulness he fell a prey to that insidious disease, consumption, and was unable to bring into play the energy with which he was endowed, and from which so much had been expected. He died September 23d, 1874.

PEOPLE'S WORKS, Jacob Naylor, Proprietor, Philadelphia. These works are situated at northeast corner of Girard avenue and Front street, and were established, in 1835, by Anthony Davis, and by him operated, as an iron foundry, until November 1st, 1846, when the present proprietor, in connection with other partners, came into possession of the same. After various changes in the firms, Jacob Naylor from time to time purchased the interests of the several members, and on January 1st, 1871, became sole proprietor of the concern. The buildings cover upwards of an acre of ground, having a front of 200 feet on Girard avenue, and a depth of 231 feet each on Front and Leopard streets. They are filled with the best machinery, including all the most modern improvements, and employ an average force of 200 workmen. The products of the establishment are steam engines and boilers, tanks, and general plate work, steam and hand cranes, hoisting machines, shafting and gearing, coupling, pulleys and hangers, sugar, saw, and grist-mills, hydraulic and power hoists and presses, marine railways, blowing tubs and cylinders, pumping engines, soap pans; also Rider's Cut-off, Tupper's Patent Grate Bars, retorts and fixtures, iron and brass castings, marble-working and general machinery. In the manufacture of these various productions there are consumed over 2000 tons of material yearly.

JACOB NAYLOR was born, December 1st, 1820, in Newport, Perry county, Pennsylvania, and was educated in the grammar school of his native town. When fourteen years of age he entered the employ of his father, whom he served for two years, and was then indentured to Andrew Doughty to learn the millwright business. Upon the completion of his apprenticeship his employer relinquished the business, and he succeeded thereto, thus commencing business on his own account. In this occupation he continued four years, and was very successful. From this place he was called to the Duncannon Iron Works as Superintendent, a position he filled for about eighteen months, giving great satisfaction to the company. He subsequently went to Hollidaysburgh, where he became Superintendent of the machinery for the rolling mill in that section, and remained upwards of a year. Thence he removed to Philadelphia, and, in connection with five others, became a joint proprietor and part owner of the People's Works, which was then only a small concern, but has since been augmented to its present large capacity, mainly through his indefatigable industry and energy, while its products rank with those of any works in the country. He has uniformly avoided and declined all political honors and office; but, nevertheless, has efficiently served many corporations in different capacities; among these may be named a Directorship in the Northern Liberty Gas Works; also in the Manhattan Insurance Company of New York; he is a Trustee of the Philadelphia Almshouse, and has been a Manager of the Franklin Institute for several years. He was one of the original founders of the Eighth National Bank, and has been President of the same for the eleven years of its existence. But few in life have been as successful as he, and few have better deserved success.

JOHN TOWER, Builder and Proprietor of the first mill in Manayunk, was born in Philadelphia, September 10th, 1758. He was of worthy Scotch-English extraction. His educational advantages were small, but he possessed great natural talents. Having acquired, in Philadelphia, a complete and practical knowledge of ship-carpentering, he became owner and commander of several vessels. Subsequently he engaged successfully in various mercantile pursuits, in manufacturing, farming, and in building operations. While interested in the latter occupation, he visited Manayunk, and foresaw the advantages which it possessed as a manufacturing town. Through his unaided enterprise and efforts the first mill was there erected; his were also among the earliest homes built there, and it is to him that the present flourishing town of Manayunk, with all its great interests, owes its first development. At the outbreak of the Revolutionary conflict, he, though a minor at this date, served with discretion and intrepidity, under Smith, in Mud Fort, at Trenton. Subsequently he was actively engaged in manufacturing, at Germantown, during the war of 1812; and while this second conflict was in progress, furnished the Government with large quantities of kerseys and woollen goods of various descriptions. In 1814, he moved to Rock Hill, and there built two substantial mills. Thence he returned to Manayunk, where he remained during the greater part of the years 1818–'19, and died, April 25th, 1831.

THE EXCELSIOR STOVE WORKS, conducted by the firm of Isaac A. Sheppard & Co., owe their origin to a co-partnership entered into by Isaac A. Sheppard, Jonathan S. Biddle, James C. Horn, William B. Walton and John Sheeler, as the original associates; but their number was subsequently increased by the admission into the firm of Thomas Walbrook and Daniel Weaver.

The business was commenced in 1859, by the securing of a property at Seventh street and Girard avenue, and the purchase of the necessary machinery and patterns. The capital employed in this concern was obtained by the contributions of the different members of the firm, and was at first limited, the partners relying on their intelligence and labor to supply its place in the struggle they were about to begin with wealthier and long established houses, who, in order to drive them out of the market, sold their own goods below cost price. This was an unanticipated obstacle; but they bravely met the issue, and for over two years the contest of capital versus industry, skill and indomitable perseverance, lasted. In this unequal contest, the firm struggled manfully, and at the end of the third year led their competitors in the race. Having won the implicit confidence of the public, by their promptness and the excellence of their productions, they began to reap the reward of self-denial and industry. The outbreak of the war, in 1861, found them in a prosperous condition, and their admirable management enabled them to maintain their rank. All through that trying period, they had implicit faith in the final and conclusive triumph of the Union arms, and foresaw that the change in the domestic relations of the slave would largely increase the demand for their goods, and that cooking stoves would be in demand by every family having the means of obtaining them. Their plans culminated in the erection of a foundry in Baltimore, in the early part of 1866, which was put into operation in August of the same year, for the supply of the Southern trade and the relief of the Philadelphia works, already taxed to their utmost capacity. Notwithstanding that the Baltimore works turned out from fifteen to twenty tons of castings per day, the Philadelphia establishment speedily outgrew its capacity, and the firm purchased, in June, 1871, of the Frankford & Southwark Passenger Railway Co., their present site, comprising more than two and a half acres and occupying an entire square of ground, 500 feet by 235 feet, included between Third and Fourth streets, and Berks street and Montgomery avenue. Having made the necessary alterations, they removed thither, and have since enlarged the buildings, which now cover an aggregate area of 76,000 square feet. This establishment produces from thirty to forty tons of castings per day, while both turn out about 8000 tons per annum, in which are included from 45,000 to 50,000 stoves, besides heaters, ranges, hollow-ware, plumbers' goods and large quantities of miscellaneous castings. They make 137 varieties of cooking stoves and ranges, 110 kinds of heaters and heating apparatus, and give employment to about 400 men, with a pay roll averaging $25,000 per month, which affords direct support to nearly 2000 persons. The motive power is obtained from a forty horse engine, and the transmission is over a steel wire rope, five-eighths of an inch thick, running over a sheave eight feet in diameter, at the rate of two-fifths of a mile per minute, the power being conveyed to great distances with much less loss from friction than by the ordinary belting. This is the first extended application of this ingenious contrivance in this section, though it is largely used in Switzerland, where it was first employed.

The work is carried on under the immediate personal supervision of the members of the firm, who are skilled mechanics of large experience; and their early struggles, their signal triumph over all difficulties and the proud place they have won, are noble incentives to enterprise and perseverance, and show the potency of determined effort for the accomplishment of any just end. To these facts, and their strict integrity and punctuality, may be attributed much of the success which has marked their business operations.

ISAAC A. SHEPPARD was born in Cumberland county, New Jersey, July 11th, 1826, and, having received a limited education, began to earn his own living at eleven years of age. His parents removed to Philadelphia in 1840, and in July, 1843, he entered a brass and iron foundry, to learn the moulding trade. His employer having died in December following, he became an apprentice of Charles W. Warnick & Co., in June, 1844, and soon won, by his industry and intelligence, the appreciation of his employers, and thoroughly mastered the business in all its branches. At the expiration of his time, he became a journeyman, and was promised employment so long as they had work for one. He remained with them until the death of Charles W. Warnick, and, in 1859, formed the present co-partnership. He served three terms, from 1859 to 1861, in the State Legislature, where he was an influential member, and left a pure and noble record. He has contributed much to the advance-

Isaac A. Sheppard

"Milton Car Works, Penn"

ment of the interests of working men, and was one of the originators of the General Law Relating to Building Associations, as well as one of the founders of the National Security Bank, of which he is Vice-President. He is also a prominent and high official member of the Independent Order of Odd Fellows and other benevolent societies. He has long held, by election of Councils, the position of Trustee of the Northern Liberties Gas Company.

DANIEL WEAVER was born in Montgomery county, Pennsylvania, November 22d, 1809. His parents removed to Allentown, Lehigh county, Pennsylvania, in 1811, and he remained there until he was fifteen, receiving a limited education in the schools of that place. He then became an apprentice to his older brother, who was conducting a small foundry near Pottstown. At the age of twenty he came to Philadelphia, where he worked in various foundries, including those of I. P. Morris & Co. and Park & Tiers. After experience in New York, Albany and other cities, he became a journeyman for Warnick & Leibrandt, afterward Leibrandt & McDowell, in 1838, and in 1840 was advanced to the position of foreman, in which he continued until he engaged in the present enterprise.

JAMES C. HORN was born in Montreal, Canada, July 25th, 1829. His parents having removed to Troy, New York, in 1843, he entered the foundry of Collar & Jones of that city, in 1844. He advanced by successive steps until he mastered the moulding trade and became a journeyman. His educational advantages were extremely limited, and he received most of his mental culture in night schools after being apprenticed. He removed to Philadelphia in 1848, where he worked as journeyman with Warnick & Leibrandt until he associated himself in the present co-partnership.

THOMAS WALBROOK was born near Manchester, in Lancashire, England, September 17th, 1816. He was principally educated in the night and Sunday schools of his native county, as his days were occupied from the age of seven to twenty-six in the two large manufacturing establishments of which his father was the manager. In them he thoroughly mastered the manufacture of textile fabrics and machinery. He arrived in New York April 4th, 1842, whence he came to Philadelphia; since then he has been a resident of Pennsylvania, never living at a greater distance from Philadelphia than Conshohocken. After large experience as foreman in various first class weaving mills and machine shops, he became foreman for Cox, Whiteman & Cox in 1855, and remained until he became a member of the present firm. He was an officer in the Pennsylvania Militia during the late civil war, in which every male member of his family was engaged.

WILLIAM B. WALTON was born in Berks county, Pennsylvania, May 22d, 1823. His parents removed to Lebanon county in 1825, where his father died the following year. He then went to Chester county, where he was educated and lived until 1840, being engaged in agricultural pursuits. In the latter year he went to the moulding trade at the Cold Brook Furnace in Lebanon county. Having completed his training in 1843, he worked as a journeyman in Swatara Furnace until 1846, whence he went to Pottsville. He removed to Trenton in 1848, and in 1849 came to Philadelphia, where he was employed in several foundries, and lastly with Abbott & Noble, where he remained until he united in the establishment of the Excelsior Stove Works.

THE MILTON CAR WORKS are owned by the firm of Murray, Dongal & Co. They were originated in the year 1864, when a foundry, which had suspended operations, at Selingsgrove, Snyder county, was purchased by the above named firm, and removed, by means of a raft, to Milton, a town some miles above on the Susquehanna river, and erected in that place. The firm possessing but a very limited capital, were generously aided by some of the citizens, particularly so by Dr. John McCleery, father of one of its present members. Several changes have taken place in the members of this association, but the name has not been altered.

The hands employed at the commencement were comparatively few, and the quantity of work turned out, the first year, was in proportion to the force engaged; but their number has gradually increased with the growth of the business. The skilful management of the partners, and the care displayed in the production of none but trustworthy work, soon brought about their natural result, and the establishment began to grow steadily till it attained its present importance, as one of the most extensive manufactories of its class in Central Pennsylvania. The chief business carried on at these works is the building of railway freight cars: but a large force of workmen is constantly employed in repairing damaged cars, a very considerable branch of industry along many of our railroads. Another important feature is the manufacture of oil cars and

tanks. The transportation of coal oil, along our railways, has now become one of the most extensive branches of the carrying trade; and to avoid the heavy risks formerly run from the inflammable character of this species of freight, oil tanks, to supersede the usual barrels, were devised, and the firm in question entered largely into their manufacture, and has invented some improvements in their construction. In addition to the foregoing, there is yet another branch of manufacture carried on at these works; namely, that of car materials or findings, which is conducted on a large scale, the firm being prepared at all times to supply bolts, iron appendages, etc., in great or small quantities as may be needed. Their specialty, however, is the building of freight cars, to which they give most particular attention. The lumber employed for the purpose is bought in large quantities from the original owners, when it is conveyed to the works, where it is seasoned, sawed, planed, etc., and, after due inspection, employed in the manufacture. By these useful precautions, they are able to maintain the reputation they have already gained. In the building of these cars every portion of the labor is performed at the works, except making the wheels and axles. The iron tanks for carrying oil are made entirely on the premises. They are completely fireproof, not a piece of wood being used in their construction. They are large, and contain from 3000 to 4000 gallons. The present condition of the business is highly prosperous, and the progress made, in less than ten years, appears almost fabulous. At present the works, when in full operation, employ about 430 men, and the monthly amount paid out for wages is from $17,000 to $18,000. They cover an area of about eight acres, and use no less than 400 tons of iron per month, and 4,000,000 feet of lumber per annum.

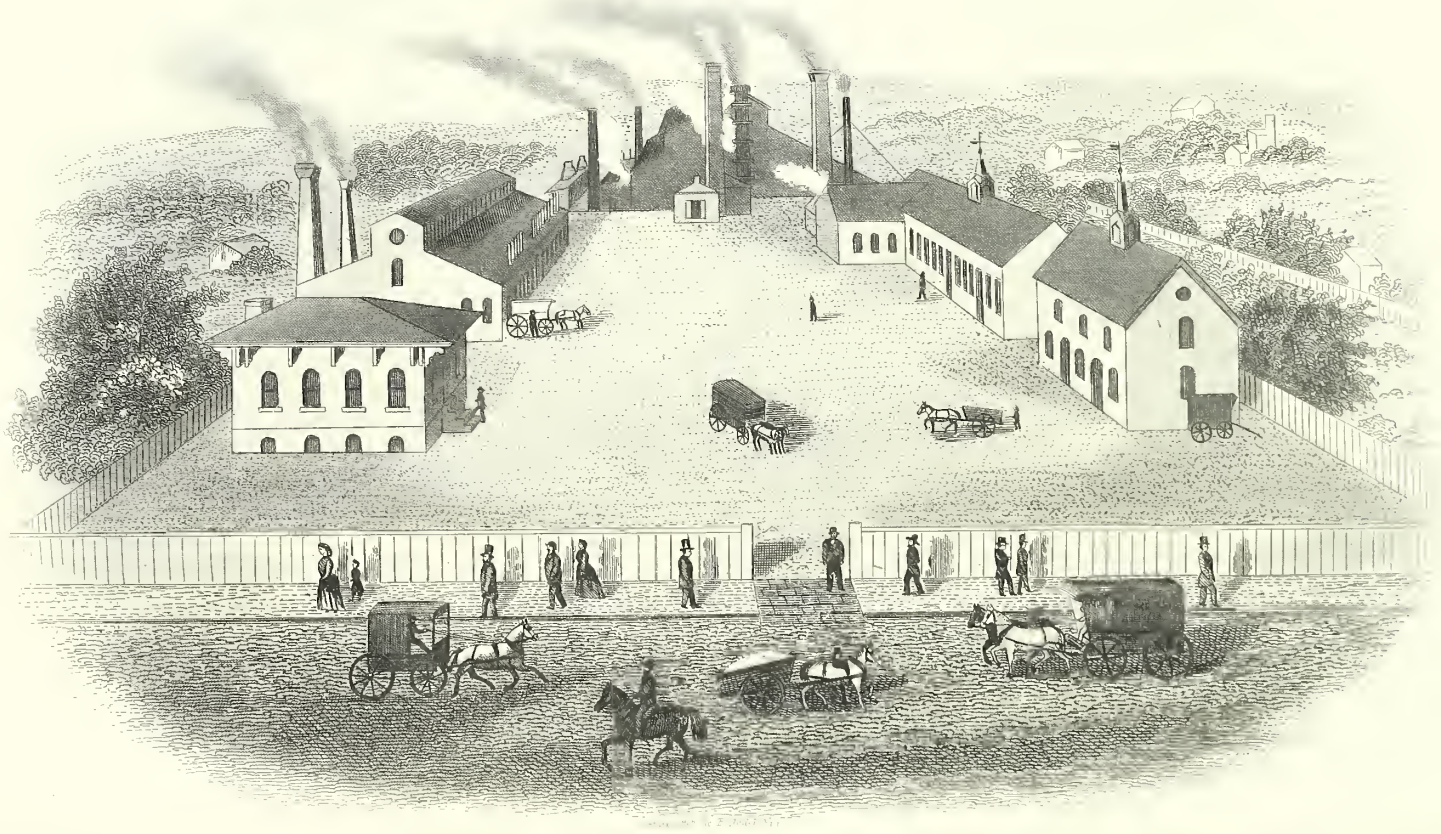
Special departments are allotted to the various processes of sawing, planing, etc., as well as of building, painting and finishing the cars, all being connected by movable tracks; thus enabling the workmen to move the cars from one department to another as the work advances. The peculiar feature, in the management of this concern, to which may be ascribed much of its remarkable success, is, doubtless, the fact that each department of the business is superintended by one of the partners, who is fitted, by his antecedents and special knowledge of that branch, to take entire control of it. This division of labor has been attended with the happiest results. The particular article in which they excel competitors is their freight cars, which, as before stated, are their specialty; and to their construction so much care and attention are devoted that they would seem to have attained perfection.

The present members of the firm are: S. W. Murray, mechanical overseer; W. P. Dougal, general superintendent; Charles Comly McCormick, financial manager; and John C. McCleery, advisory partner in the firm.

S. W. MURRAY was born in 1829, at Lewisburg, Pennsylvania, where he was educated. When quite young he went to Lancaster, to learn the trade of machinist, and, after remaining there for about a year, entered the Portland Locomotive Works, where he continued his studies. Subsequently, he acted as clerk to railway contractors, in Indiana and Rhode Island. Returning to Lancaster he found employment, as a mechanical draughtsman, and, in 1856, bought an interest in a machine shop at Williamsport, which was burned down a few months afterwards. He started it afresh, but a commercial panic upset him a second time. For the next few years, he was employed in different places, till 1864, when he went to Milton. He not only possesses a thorough knowledge of mechanics, but has a certain gift for invention. He has patented a punching and shearing machine, also a screw-cutting machine, and devised some improvements in the manufacture of oil tanks. He married Matilda, daughter of Dr. John Meckley, of Milton.

WM. P. DOUGAL is a native of Milton, and was born in 1823. He was educated in his native town, where he remained till the age of 20, when he accompanied General Hammond to Mexico, as his clerk. On the death of that general, he returned home and engaged in farming, pursuing that occupation till the outbreak of the rebellion. He took an active part in forming a military company in Milton. Of this he was chosen lieutenant, and, subsequently, became its captain. He was present at several battles, amongst others that of Gettysburg, where he was wounded.

CHARLES C. McCORMICK was born at Paradise Farms, Pennsylvania, and received his education at Lewisburg and McEwensville, Pennsylvania. His early life was passed upon a farm. During the late war he served as a private in Company D, Pennsylvania Cavalry. He was afterwards promoted to the rank of captain, and served on the staff of Generals Stanley and Thomas, at whose solicitation he was advanced to the rank of Colonel, in 1863, and, later, through the influence of Generals Wilson and Thomas, was appointed Brigadier-



Wm. & Henry Rowlands Steel & Spring Works, Frankford, Indiana

General of Cavalry. During the four years of his service he gained the uncommon distinction of rising from the ranks to be a general in the army. In 1865, he bought the interest of I. S. Stoughton, of the original firm of Murray, Dougal & Co. He married Charlotte A. Wright, daughter of L. M. Wright of W. Edwards, New York, and has a family of three children.

JOHN C. McCLEERY is a successful lawyer in Milton, and son of Dr. John McCleery.

WILLIAM AND HARVEY ROWLAND. This firm, which had previously been engaged in the manufacture of saws, commenced that of springs in 1842; of steel in 1845; and of Norway shapes in 1871. Part of their works are located at Frankford, and the remainder on Beach street, in Kensington; but preparations have been made for the removal of all their machinery to their location in Frankford. For this purpose a large brick building, 215 feet in length, has been erected. Besides this there are several large buildings now occupied by the firm at that place. The operations of the works give employment to 175 men and boys. The large rolling mill is particularly interesting, while their spring shops present a scene of unceasing activity. All of the springs manufactured are made of Swedish stock. It is either imported directly by the firm, or ordered from the agents of the companies having offices in America; and from their long experience in this special branch of manufactures, they are of necessity well acquainted with the different brands of this foreign material. In 1872 they worked up over seventeen hundred tons of Swedish iron, and made, in addition, over twenty-one hundred tons of steel. Their trade is chiefly confined to the United States, and their purchasers are principally iron and hardware merchants.

The original members of the firm were Thomas, Benjamin, William, and Harvey Rowland, four brothers. The first two, who were the senior members of the firm, were separately engaged in the shovel and spade business, and retired from the firm in 1861. Benjamin, one of the retired partners, and William, died within a few days of each other, in December, 1872. The interest of William Rowland, deceased, is represented by his heirs, and no change of firm name has taken place.

WILLIAM ROWLAND.—The name of Rowland is widely and most favorably known in the annals of Pennsylvania, and particularly in the manufacturing community. It can truthfully be said that no one of them ever sought or received a political office, and that their great incentive and ambition in life has been to succeed in the industries of the country. William Rowland was a striking illustration of this trait. He was born in Montgomery county, Pennsylvania, on January 8th, 1813. At an early age he was indentured as an apprentice to two of his elder brothers, who were successfully carrying on the manufacture of saws. This contract was really made at his own request, and from the time he entered these works until his death, his life was wholly devoted to manufacturing interests. It was by his great industry, energy and inventive genius, that he rose from the position of an apprentice to the head of one of the most prominent manufacturing establishments of the country. Death suddenly summoned him from the midst of these active labors; he died after an illness of two days on December 18th, 1872.

HARVEY ROWLAND was born in Montgomery county, Pennsylvania, on July 6th, 1815. At an early age he showed a great fondness for mercantile and financial affairs, and his education was conducted with due regard to this taste. He has been, from the beginning, the financial partner of the firm, and continues to act in that capacity. His nephews, Edward and Charles, sons of William, deceased, and his sons William and Frank S., have an interest in the firm, and give their attention to the mechanical department, all four of them having been educated to the business.

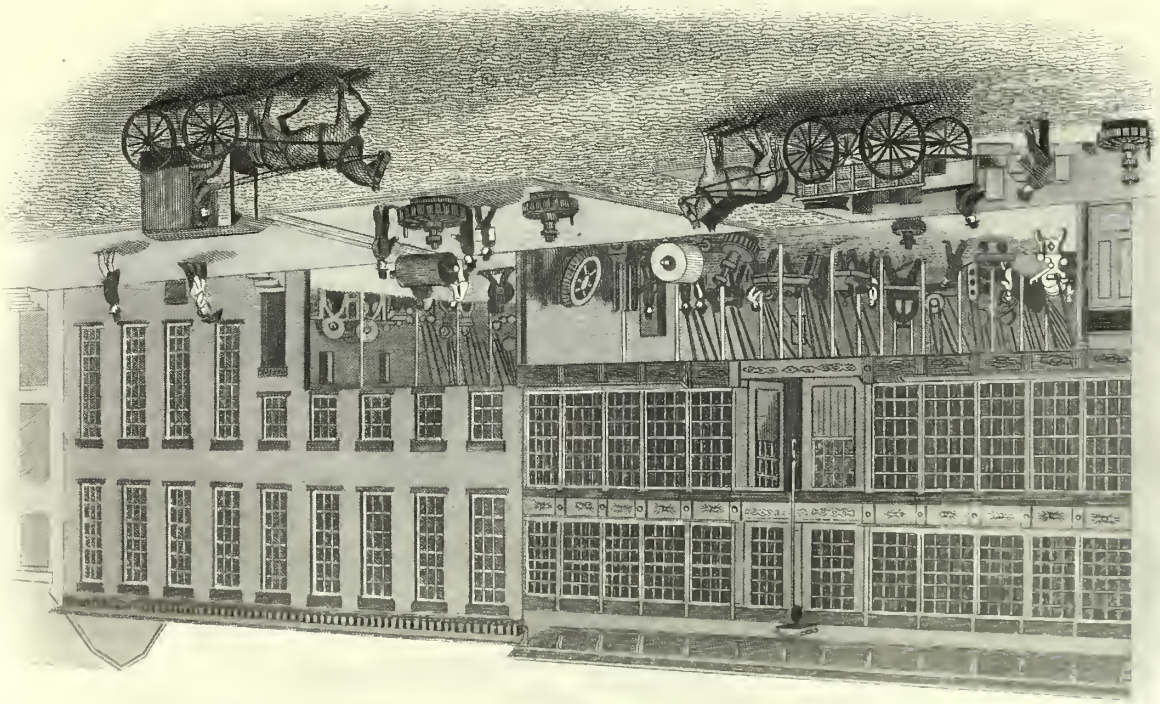
HENRY LEH, Boot and Shoe Manufacturer and Merchant, was born June 24th, 1839, in Slatington, Lehigh county, Pennsylvania. His father, of the same name, was a farmer of German descent, and until the age of eighteen, his son knew no other language, and had received but little education of any kind. These deficiencies he sought to remedy by earnest study, at the same time working at his trade of a shoemaker. In Allentown, whither the family moved in 1845, he worked first as an apprentice and then as a journeyman, until he had accumulated nearly $200, with which very modest capital he started a shoe and clothing store. Later he bought out a retail shoe establishment, and in partnership, first with Wm. S. Young, then with his brother Hiram, and afterwards with J. L. Brooks, he continued to enlarge his business and extend its

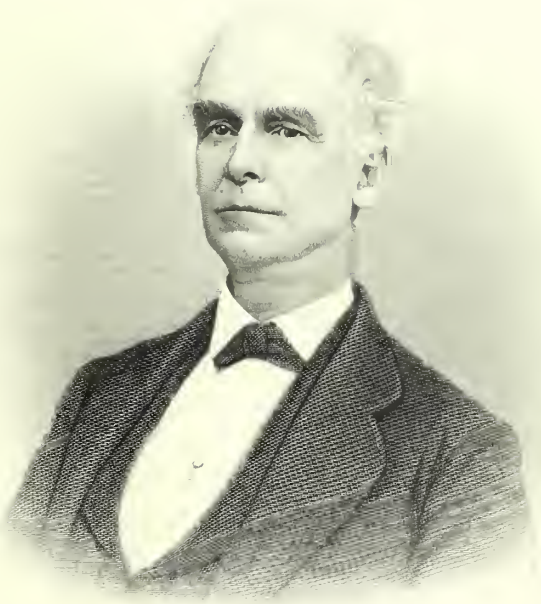
connections, until now the house expects to do a business of half a million yearly, with corresponding profits. Careful attention to business, combined with high principles, have led to this fortunate result. A member and liberal supporter of the Evangelical Church, he is also a decided advocate of the temperance movement, an earnest opponent of slavery and of municipal corruption, and a friend of all measures beneficial to the city and humanity at large. He has been School Director, member of City Council, and Director of the Allentown National Bank. He was married in 1858 to Angelina Trexter, of Allentown, and has three children living.

NELSON GAVIT, Machinist and Manufacturer, was born in Connecticut, October 28th, 1810. His parents being in humble circumstances, he received but an ordinary common school education. He resided with his parents until 1827, when, having evinced a decided taste for the mechanical arts, he was apprenticed to a machinist. During the opening year of his apprenticeship, the first "Fourdrinier" paper-making machine ever used in this country was imported from France by a firm in Boston. A suitable water-power having been purchased, a mill was erected and the necessary appurtenances procured to put the new machine into operation. Its success surpassed the anticipations of the most sanguine, and drawings, patterns, etc., having been made, they began the construction of others upon the same plan. From that time he has devoted himself assiduously and uninterruptedly to the manufacture and perfection of the "Fourdrinier" machine, and his mechanical skill and genius have suggested nearly all the improvements made upon it. At the expiration of his term of apprenticeship he found insufficient scope for his active ambition, and went to Philadelphia, where he established himself, in a humble way, in Lodge street, and commenced the construction of paper-machinery. Obliged, by increasing business, to seek more capacious accommodations, he removed to the present site of the new Masonic Temple, Broad and Filbert streets, in 1838, and there he twice beheld the labor of years swept away in a single hour by the burning of his works. He was thus deeply involved; but, nothing daunted, he renewed his efforts with a fixed determination to build up a successful business. He located himself, in 1854, upon his present site, Nos. 224-230 North Broad street, where, by the exercise of skill, energy and perseverance, he has established the largest and most complete works of the kind on the continent. They have a frontage of 116 feet on Broad street, and a uniform depth of 396 feet; they are three stories in height, employ 160 men, and produce about twenty first-class machines per annum. The motive power is derived from a fine 120 horse-power engine, and the works are filled with the most improved machinery and tools to be obtained in America or Europe.

In connection with the erection of paper-mills, he has made an especial study of Hydraulics, in which science he is so well versed, practically and theoretically, that his opinions are sought and valued at home and abroad. On this account he was selected by James Leffel & Co. as their agent for the introduction of their improved turbine wheel, and through his efforts it has become the most popular water-wheel extant. Mills of his construction are found in nearly every one of the United States, as well as in the British Provinces and the West Indies. He has also sent a large amount of paper-machinery to Europe, and is now (1873) fitting out the extensive mills of Prince Bismarck, in Germany. Endowed with an excellent constitution, geniality of temper, and a keen sense of humor, he has preserved a large measure of the activity and vigor of early life. Kind and hospitable, his fund of anecdote, as inexhaustible as his appreciation of the ludicrous and racy is vivid, renders him an ever-welcome companion in the social circle, while his men, most of whom have been years in his employ, uniformly esteem and respect him. He has acquired a handsome competence, which enables him to dispense that liberal and unostentatious charity for which he is so well known, despite the quietness with which it flows. But the world may never know all the schemes of benevolence emanating from this source.

THE LEICESTER KNITTING MILLS, Charles Spencer & Co., proprietors, are located on Cumberland street, Germantown, and extend from Mill to Armat street. They were originated in October, 1843, by Charles Spencer, who commenced operations in a garret on Main street, Germantown. After operating for six months he removed to a building on Church lane, Franklinville. In the latter part of 1844, the building having proved too small, he returned to his original location. In the early part of 1846 he removed to the present site of the St. Stephen's M. E. Church, where he continued until about the commencement of 1848, when





Nelson Gavit

CHARLES SPENCER
LEICESTER KNITTING MILLS

he occupied the late flour mill of Wyndham H. Stokes, on Mill street, and there remained until 1850, when he purchased a portion of the present site and erected a mill 75 × 35 feet. With the additions made from time to time to afford necessary additional accommodations the works now cover about two acres, and comprise, in addition to the old mill, now used as a wool warehouse, a three-story warehouse 170 × 30 feet, a four-story mill 160 × 80 feet, a five-story weaving mill 70 × 40 feet, a two-story yarn warehouse 70 × 30 feet, with dye and bleaching houses, trim shops and all the necessary outbuildings. The machinery is all of the best quality and pattern, and includes all the latest improvements for the saving of labor and improvement in manufactures. They produce a great variety of woollen goods, hosiery, fancy knit goods of every description, shawls and many other articles, all of which are sold, without the use of agencies, from their own warehouses in Philadelphia, New York, Boston, Chicago, and Baltimore. The New York house has been in operation for twenty-five years, and from the start they have always sold all their own goods. They engage about six hundred hands, some of whom have been in their employ for twenty-eight years. The establishment is complete in itself, taking the wool from the sheep, and producing everything within itself. Their products have justly become celebrated in all parts of the United States.

William Spencer, the father of the founder, was intimately connected with him in the management of the business from the start, and continued to superintend the works until his death, in 1863. Charles Spencer was the sole proprietor until January 1st, 1857, when he admitted his brother Wm. G. Spencer under the firm name of Charles Spencer & Co. They received into the firm Charles Poulson, who had for many years charge of the New York warehouse, on January 1st, 1867, and on January 1st, 1868, Robert S. Spencer, the elder son of Charles Spencer, became a partner. Wm. G. Spencer having retired in January, 1869, Charles Spencer's younger son, Charles H., was admitted January 1st, 1870, and the firm so continues (1873).

CHARLES SPENCER, the founder, was born at Enderly, near Leicester, England, June 12th, 1821. His educational advantages were limited, but he improved every opportunity to cultivate his naturally powerful intellect. His father, Wm. Spencer, landed with his family in New York, May 4th, 1842, whence they went to Philadelphia the following day. Thrown among strangers, Charles at last found employment as book-keeper and collector at a salary of five dollars per week. By rigid economy and self-denial he had saved the sum of fifty dollars by July, 1843, and in October following engaged in the knitting business. He married, May 27th, 1845, Priscilla Smethurst, sister of Richard and Robert Smethurst of Philadelphia, and a native of Lancashire, England, where her father had been a leading manufacturer. As soon as the law allowed, he became a citizen, and has acted successively with the Whig and Republican parties, though never an aspirant for political honors. His greatest activity outside of his business has been in the promotion of charitable and benevolent enterprises, and his actions have been characterized by the spirit of the truest philanthropy.

GEORGE W. WATSON, Carriage Builder, third son of the late Charles C. Watson, was born in Philadelphia, March 1st, 1805. His grandfather, having emigrated from England and settled in Kensington, erected and operated for many years an iron foundry at that place. He was educated in the best schools the city afforded, and finished his course at the boarding-school of Mr. Tatham, near Frankford. Immediately after leaving school he was placed under the instruction of Thomas Ogle, a coach-maker, on Sixth street above Chestnut, and there his industry and mechanical genius soon resulted in his becoming an adept and skilful mechanic. He remained there until after he was of age, when he commenced business on Prime street, and soon afterward removed to Laurel court, opposite York (now Levant street), running from Spruce to Pear, between Second and Third. The building was originally erected by Robert Kid for his son Robert, who having learned the coach-making business with Thomas Ogle, engaged in it on his own account, but shortly relinquished it for another pursuit. In this location George W. Watson was eminently successful, and continued to increase his business until the death of Thomas Ogle, when he associated in partnership with the late Thomas Ogle's son Williams, and occupied the factory on Sixth street. After several years this partnership was dissolved, and the business was continued by George W. Watson, who purchased the property of the heirs of Thomas Ogle. He also owned and occupied the factory at the Falls of the Schuylkill, and subsequently built that at Thirteenth and Parrish streets, which still continues in the possession of his heirs. After an unusually prosperous career, he, about 1850, purchased a site on Chestnut street

above Twelfth, against the protest of his friends, and erected thereon the buildings now occupied by Jacob Laudenslager,—who was connected with him from 1837, and still continues the business,—as well as Concert Hall, which he purposed to convert into a sales and show room. He was thus the business pioneer of West Chestnut street, and there attained a reputation and success unequalled by any coach builder in the United States. He was the first successful builder of the light trotting wagon, for which he attained an enviable reputation. He excelled all others in the mathematical precision of his wheels and the accuracy of their revolutions, as well as in the durability and lightness of his vehicles. He won permanent reputation and a handsome competency. His death occurred suddenly, on February 8th, 1857, and the carriage business lost one who had done much to promote its interests. He married, October 15th, 1840, the daughter of William Christie, of Philadelphia. He was too much devoted to his business to become actively engaged in politics, but he was a consistent adherent of the old Whig party. For many years he was an active member of the Pennsylvania Fire Company and the Washington Greys. He was also connected with many of the corporations and public enterprises of the city. A public spirited and liberal man, he was an active promoter of every measure for the public good.

THE PORT CARBON IRON WORKS were founded in 1843, as a machine shop, by Tobias H. Umbersteen, whose business consisted in the construction of engines and colliery machinery generally, and amounted, perhaps at that time, to $50,000 a year. In 1865, a company of Eastern capitalists purchased the concern, which they carried on for a year, when, through financial reverses, they were forced to abandon it. It was then bought by Colonel Z. P. Boyer, the present owner of the establishment, who paid $85,000 for it, in 1866. During the administration of the Eastern company, it had not increased, and its business capacity still stood at the same figure; but the new proprietor immediately commenced making improvements and extending the business. He at once erected a rolling mill and a spike factory, shortly afterwards enlarging the latter, which is at the present time capable of producing thirty-five tons of spikes per day. These enlargements necessitated the addition of one hundred and thirty employés, and raised the amount of products to $300,000 per annum. The rolling mill, spike factory and other improvements, cost $125,000. In 1872, he made further additions to his works by building a blast furnace, capable of turning out two hundred tons of metal weekly, and costing $156,000. This new erection required another increase in the number of hands employed, and fifty more were taken on. The furnace produces one hundred and seventy-five tons of pig iron per week, amounting in value to about $350,000 per annum. The concern is as independent of outside aid as can well be. It has its own railroad cars and lime quarries; mines all the coal consumed and most of the ore used in the manufacture. In 1873, he erected a building for making street rails and T rails (forty pounds), the manufacture of the former increasing the business to the extent of $250,000, and requiring an additional force of seventy-five employés, either directly or indirectly. The goods manufactured are bar iron, of from ¼ to 2½ inches; squares, from ⅜ to 3¾ inches; flats, from ⅛ to 1¼ by 4 inches wide, and all intermediate widths and sizes; also what is known as muck bars. This last article is principally sent to Pittsburgh; the bar iron is used in the neighborhood, and the spikes are sold to railroads generally, their production amounting to four tons in every ten hours. The works are, of course, on a very extensive scale, and a model of good arrangement. The admirable system of economy employed has resulted in great advantages, as everything in the way of minerals is brought directly into the works, by adopting the most improved labor-saving machinery and arrangements. The street rail mill is regarded as one of the best constructed and most perfect in the country, and the proprietor claims to have the best blast furnace in the State; a claim which appears to be confirmed by the general opinion of experts in such matters. This furnace was built entirely under his personal supervision, and, since it has been in use, there has never been a single interruption in the cast. Independently of all the additions and improvements above enumerated, the business generally has largely increased and expanded under the present management, until, to-day, it reaches the amount of nearly $1,000,000. As already stated, in 1868, the returns did not exceed the insignificant sum of $50,000, and the vast stride from that to the present figures, in the short space of five years, is wonderful to contemplate, showing an almost unprecedented success. It is a remarkable instance of what may be done by industry and enterprise, combined with intelligence and a capacity for grasping the whole details of management, qualities eminently distinguishing the proprietor, and

Geo. W. Patton

J. W. Boyer

which are, undoubtedly, the cause of his unusual prosperity.

He is aided in the business by his brother, Valentine, a young man about twenty years old, who is General Superintendent of the works. A thoroughly practical mechanic and moulder,—trades which he learned on the premises,—he is honest, sober, careful and reliable in every way, and makes an excellent manager.

ZACCUR P. BOYER was born in Schuylkill county, Pennsylvania, October 28th, 1832. He is the son of Samuel P. Boyer, an early operator in that district, who died when his son was but ten years of age, leaving him and the rest of the family in poverty. He was educated in the public and private schools of Pottsville, and, when quite young, worked in the mines, he and his brothers supporting the family and educating the younger children. He went to Patterson, where he worked for Charles Silliman, who, taking a fancy to the lad, assisted him. He rose from miner to be clerk and book-keeper, and, when twenty-one years old, entered a dry goods store as clerk. In 1854, he was married to Catharine C. Williams, of Port Carbon, by whom he has had five children, and in the same year commenced mining on his own account, with a few hundred dollars, the result of his savings. Successful for the first three years, he failed at the end of that time. He again started, but without capital, and continued so employed till the outbreak of the rebellion. In 1861, he entered the army as Lieutenant in the 96th Pennsylvania Volunteer Regiment, and left Pottsville (November 8th) for the front. For eleven months this regiment saw active service with the Army of the Potomac, and he attained the rank of Adjutant. He was appointed by the Governor of the State Lieutenant-Colonel in the 173d Pennsylvania Volunteers, and, at near the same time, was elected Major in his old regiment. He went to Norfolk, Virginia, on staff duty, where he was appointed President of the Military Commission and Assistant Military Governor of that portion of Virginia, so remaining till the battle of Gettysburg. He resigned in 1864, and returned home, where he entered the coal business and made money. In 1870, having sold all his outside interests, he began to devote himself solely to the works, with the success already described. He is, besides, one of the proprietors of the Ringgold Iron and Coal Company. He is a liberal supporter of the church, and highly esteemed by its members. In character, he is energetic, pushing and clear-headed. From poverty and hardship he has raised himself to wealth and luxury by his own unaided efforts. He is truly one of the representative men of the State, and the qualities he exhibits are as rare as they are honorable to their possessor and beneficial to the community of which he is a member.

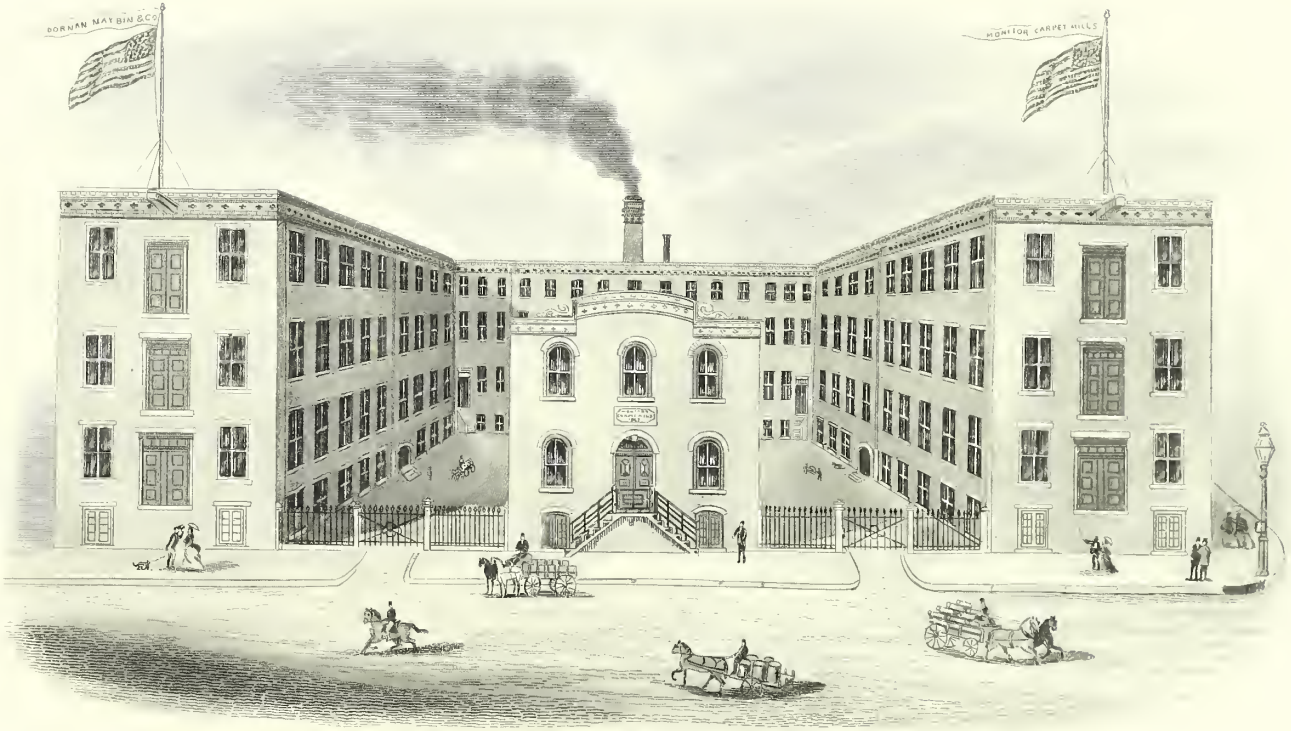
JEFFERSON BELT WORKS, Forepaugh Brothers, Proprietors, N. W. corner Jefferson and Randolph streets, Philadelphia. This business originated with William F. Forepaugh, Jr., who had served an apprenticeship with his father in the currying and leather business, and who, when twenty-three years of age, rented a tannery at the corner of Otter street and Germantown avenue, where he commenced the tanning of sole leather, butts, and whole hides for belting and other purposes. In 1859, having associated his brother, F. H. Forepaugh, under the firm name of Forepaugh Brothers, they purchased a large property on the northwest corner of Jefferson and Randolph streets, and erected the tannery at present occupied by the firm. This large brick structure is perhaps the finest and most extensive in the State, containing the latest improvements, and is, in every respect, well adapted to the tanning of oak belts and slaughter leather. The main building is 202 feet long and 55 feet wide, four stories high, and built of brick. The vat-room occupies the entire ground floor of the works, and contains 112 vats. There are 14 leaches, 7 by 9½ feet dub; also 100 vats of the same size used as "handlers and layaways." Steam power is used, supplied by a Corliss engine of forty horse power. The leather, after being tanned, is conveyed to the drying lofts, by means of a very powerful hoisting machine. The capacity of the works is 10,000 heavy steer hides yearly, and the whole is tanned for belting purposes. The work is done in the old-fashioned mode, using the best quality of bark for making their liquors, which are applied cold, avoiding all chemicals, and allowing from eight to twelve months for tanning. Such leather is now rarely found, and it is certainly second to none in the country. The long experience of the firm in manufacturing leather for belting, and the constant personal supervision given to the business by the proprietors, the employment of none but the most skilful workmen, and improved machinery, enables them to guarantee perfect satisfaction to the trade, who desire a superior article of real oak-tanned leather for belting, or any kindred purpose. Beside producing the material, the firm manufacture the belting

itself, made of the best slaughtered hides, tanned exclusively for the purpose. They spare no pains in currying, stretching, and finishing the leather, to make a perfect belt, and being manufactured upon the premises from the first handling of the hide, uniformity and equality are insured. The best of order and system prevail throughout the establishment, and what is very unusual in tanneries, a degree of neatness is apparent everywhere. All processes to facilitate the process of manufacture consistent with the production of a perfectly reliable quality of goods are introduced. Every precaution is taken to prevent accidents by fire, steam, or any other agency. The stables are clean and well ventilated for the comfort of the animals. The founder of the business, William F. Forepaugh, Jr., died May 9th, 1865, while on a visit to Boston. The surviving brother and member of the firm at once assumed the whole direction of the business, the style of the firm remaining unchanged. He is a gentleman of kind and philanthropic character, as is evidenced from the style of the arrangements about the premises, and before the business community, in all his relations with it, stands a tried specimen of a high-toned, honorable man. Animated by a large public spirit, he accords an earnest support to all measures for the advancement of the city.

JOHN HENRY GOULD, Manufacturer of Furniture, first started in his present line of business about the year 1845, by associating himself with a firm already established in that trade, which owned a large lumber yard and mills on the Delaware front. The business not proving successful, the other partners, in 1857, sold their interest to him. He assumed all the liabilities and continued the business alone till 1859, when he in turn disposed of it. He paid every cent of the debts due from the concern, but left himself without capital. He now turned his attention to the retail trade, and, believing it profitable, resolved to embark in it. For this purpose, he borrowed some money and established himself in one of the best localities in the city. He at once entered into competition with the large dealers, and soon, by his determined energy, industry and business qualifications, rendered himself a formidable rival to the old houses. At first, as already stated, he commenced with a borrowed capital; but his transactions increased so rapidly that the established houses became alarmed, and one large firm resolved, by a most unworthy manœuvre, to effect his ruin. Having ascertained that the premises he occupied were only rented, they purchased the property and turned him out of his store; so expeditiously, too, that $15,000 worth of his stock was actually put into the street at nightfall, where it remained till the following morning. This summary proceeding, however, eventually benefited him by stimulating his energies and forcing him to begin again under different circumstances. He bought the Madison House, on Second street near Christ Church, in the vicinity of his former stand and his old enemies. He paid $40,000 for this property, and after spending some $16,000 upon it, in the way of improvements, started the business which has since grown to such vast proportions. He then had greatly increased facilities, and possessed the finest furniture warerooms at that time to be found in the city. At first, his annual sales did not exceed $40,000; but his tact and good management, combined with a universal sympathy for the manner in which he had been treated, rendered him very popular, and his transactions steadily and rapidly rose in importance. Soon after commencing on Second street, he opened two other stores, and in one of them, that situated on Ninth street, the business doubled itself within six months from the start. Thoroughly believing in the benefit of advertising, he began to make use of it in a large way. He ordered eight wagons to be built and gaily painted with the national colors, to correspond with the name he had given to his store, "The Union Furniture Store." These were driven in procession through the streets, headed by a band of music, and produced a considerable sensation. He also resolved to advertise largely in the city journals, and applied to the Philadelphia *Ledger* for that purpose; but, being refused sufficient space in that paper, he had recourse to the *Inquirer*, and the public was astonished at seeing an enormous advertisement, covering two pages and a quarter of that sheet, descriptive of his premises and goods, likewise setting forth a list of his prices, etc. This being the first time such steps had been taken in that business, public attention was attracted and a great impetus was given to his affairs. By judicious management, the advantage then gained has been steadily improved, and he is probably the most successful man in that branch of trade in Philadelphia. He sells exclusively for cash. A novelty, introduced by him, consists in the employment of saleswomen, for the accommodation of his lady visitors. He now occupies five separate stores, connected with each other and his residence by telegraph; and, besides the large force of salesmen and women engaged in them, he gives employment to

Gould & Co. Furniture Ware Rooms. Philadelphia.

John D. Lucas



Monitor Carpet Mills.

COR. HOWARD & OXFORD STS. PHILADELPHIA

about two hundred operatives of various qualifications. He has constantly on hand an immense stock of goods. This is so large that he is able to completely furnish a first-class hotel at a day's notice. With these advantages, he is able to do a large home trade, and to ship goods to all parts of the country. His sales at present are very heavy, reaching $400,000 annually. He commenced his business under the name of Gould & Co., with the intention of subsequently introducing a moneyed partner into the concern; but his individual success has been so great that he has never carried this plan into operation. His brother, Frederic Gould, has been for many years in charge of the Second street store, while one of his sons superintends the Second street manufactory. One of the peculiar features in his business, which has gained him much reputation, is the furnishing of churches, public buildings and steamships.

He is the son of Captain James Gould, an officer in the British army, and was born in Plymouth, England, in 1825. His father, having a large family and no resources but his pay, was unable to give his son more than a limited education, and, as he was brought up to no trade or profession, his prospects in life seemed rather dreary. He had, however, travelled much through Great Britain, and at the age of fourteen was intimately acquainted with most of the routes leading through the country. He resolved to put this knowledge to use; and, for this purpose, bought goods in London, Birmingham and other large towns, which he forwarded to different points, and subsequently sold for cash to whatever customers he could find. He visited nearly every town in the country, and by these means he had amassed a little capital of about $5000 in the space of two years. Induced to invest a considerable portion of his savings in wild lands, near Milwaukee, he emigrated to the United States to take possession of his property. The vendor, however, proved to be a rogue, and decamped with both the title deeds and the money, leaving him to begin again. Having purchased some goods in England, before leaving, and shipped them to Canada, he went to Montreal to endeavor to sell them, but did not succeed, and eventually disposed of them in this country, chiefly by barter. Having spent nearly all his money, he went to New York and took up his residence with a picture dealer, who, discovering his taste and knowledge as a connoisseur of paintings, took him into partnership. For a while this business was very successful; but the store and stock being burned in the great fire, and no insurance having been effected on it, he once more found himself a ruined man. Being recalled by family affairs, he returned to England, where he remained for two years, carrying on business in London. At the expiration of this time, he came back to the United States, settling in Philadelphia, where he joined the firm in the furniture business, already alluded to. In that branch of industry, while striking out an entirely new path, he has won complete success. He is an active member of the Episcopal Church, a Royal Arch Mason, a member of the St. George's Albion Society, a member of the Board of Trade and the Humane Society for the Prevention of Cruelty to Animals, and some others. He was married, in 1850, to Amelia Gustard, of London, and has had a family of eight children, seven of whom are living.

MONITOR CARPET MILLS, Dornan, Maybin & Co., Proprietors. This industry was commenced, in 1863, with a limited capital, derived from a previous business, by the senior partner, who rented for that purpose a small three story building (20 by 20 feet) on Howard street, Philadelphia, in which he placed three looms and employed four hands. His success was almost immediate, and he soon added to the number of his looms, which he accommodated in rooms rented with that object, in different localities. In 1865, he had twenty-seven looms at work, employing about forty hands, and then gave his uncle, John Pickens, an interest in the business. In 1866, the demand for increased room and the concentration of his workmen, induced him to purchase the site of his present factory (110 by 150 feet), fronting on Oxford, Howard and Waterloo streets, on which he erected a factory (100 by 30 feet), at the same time raising the number of his looms to fifty. At this time also he gave his brother, Robert Dornan, an interest in the concern. In the fall of 1868, more extension becoming necessary, he built a one story dye-house (48 by 30 feet), a three story and basement boiler and drying house (24 by 30 feet), and a second one (54 by 30 feet), the first floor of which is used for winding, all adjoining the original structure at right angles. He also put up another building, parallel with the first (80 by 30 feet), with an engine in the basement. The first floor of this is used for finishing, the second for warerooms and offices, and the third for pattern, designing and warping rooms; while the first floor of the original edifice is appropriated to yarn rooms, and the upper floors to weaving purposes. It will be seen, by the

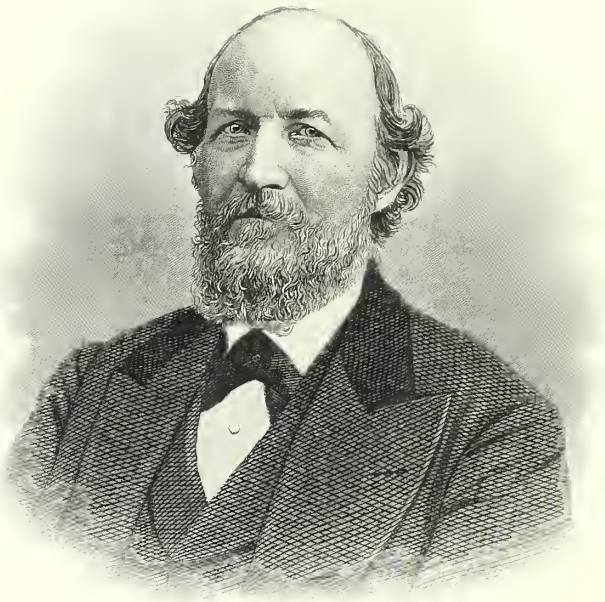
accompanying fine steel engraving, that there is yet another building in process of erection. This is destined, exclusively, to the spinning department. At present, it is necessary to rent two floors in another factory (46 by 100 feet), where six hundred and forty spindles are used, and the firm is obliged to purchase large quantities of spun wools. On January 1st, 1869, Francis Maybin was admitted as a partner, and the number of looms was then increased to eighty-six, besides seven steam looms. They were among the first to introduce this improvement, steam looms having previously been used, however, in the East, but only to a limited extent. In 1871, another novelty was put into operation, viz: a steam loom for shading, being the patent of William Murkland, of Lowell, Massachusetts, and, in the following year, fifteen more of the same kind were added. The principal of the firm has now completed a power loom, to be used without shuttles, which he believes will supersede all others in existence. He has received no less than thirteen patents upon it. It is contemplated to introduce the loom into England and on the Continent during this summer (1875). He has also taken out numerous patents for other improvements in machinery, calculated to advance the interests of this particular department of manufacture. The number of hands now employed by the establishment is upwards of one hundred and eighty, about one fourth of whom are females, and the annual product of the factory is about 650,000 yards of carpeting, requiring for its manufacture nearly 900,000 pounds of wool. The most perfect order reigns in this vast establishment; everything has been reduced to a system. The eye of the chief is over all; he is constantly on the alert and actively superintending the various departments of the manufacture. The designers have been educated by his care, and most of the operatives owe more or less to his instruction. The chief feature to which the head of the house ascribes most of his success is his unswerving course of rectitude, attributable, in a great measure, to the early counsels, influence and example of a Christian mother.

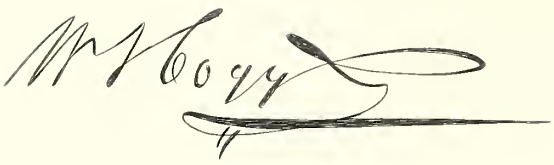
JOHN DORNAN, the principal of the firm, was born, June 22d, 1837, at Ballymena, near Belfast, Ireland, and is the son of Robert Dornan and Elizabeth Pickens. His father was extensively engaged in the linen manufacture, and continued to carry on a large business with New York till 1846, when, owing to heavy failures among his correspondents, he was compelled to wind up his affairs. He emigrated to America, with no capital, and, shortly after his arrival, settled in Philadelphia, where he began the manufacture of carpets in a small way. The son was kept at school till 1848, when his assistance was required by his father, with whom he stayed for one year. Disliking city life, he obtained employment on a farm; but, during the following year (1850), was so severely injured in the spine that his life was despaired of, and for two years he was unable to resume labor of any kind. At the expiration of that time, however, he engaged with James Martin, to learn stamping, designing and loom mounting, and stayed with him for three years, when his employer died. About a year after this, he began a similar business for himself, buying the necessary material on credit. He carried on this business successfully till 1861, when the war compelled him to relinquish it. Though unable, from physical weakness, to enter the army, he gave his time, labor and money to the Union cause. He helped to raise the 28th Pennsylvania Volunteers, and equipped Company C of that regiment at his own expense. He was appointed Messenger to the Quartermaster General's Department, but resigned in February, 1862, when he received an appointment in the Philadelphia Post-office, which he also resigned to commence the manufacture of carpets.

THE OXFORD CARPET MILLS, William Hogg, Jr., Proprietor.—The origin of this business dates back to the year 1832, when the father of the present owner of the factory started the manufacture of carpets in a small way, being one of the first in Philadelphia to undertake that branch of industry. He gradually succeeded in his business, continuing the same till 1846, when, having amassed a competency, he withdrew, entrusting it to his eldest son, who, in connection with a younger brother, carried on the same till 1850, when the partnership was dissolved, William, Jr., remaining thenceforward sole proprietor of the establishment. He now commenced afresh, beginning by erecting the handsome factory occupying Nos. 142, 148, 150 and 152 Oxford street, where he started under favorable circumstances, as a large connection was already established. Although since that period the products of the manufactory have been largely increased, they were, even at that time, of great importance, ranking among the heaviest in the country in that line of trade. Since the beginning of the business, in 1846, it has always been large, and never been allowed to fall back, the constant

John. Dorman

OXFORD CARPET MILLS
Wm HOGG Jr CARPET MANUFACTURER





aim of the management having been to adopt all modern improvements in the weaving of carpets, and in all respects to keep pace with the advancement of the times. The factory is constructed on an extensive scale, and, with its fine appearances, is one of the industrial ornaments of the city. It is commodious and convenient, and regularly keeps in employment about eighty looms, whose annual products amount to no less than $300,000. Doubtless, had the proprietor of these mills adopted the policy in vogue amongst some other manufacturers, the yearly production might have been largely increased; but his constant aim has been to conduct his business in the most prudent manner, never allowing himself to get beyond his depth in his transactions. The satisfactory result of this policy is, that during his business career he has not lost $50.0 by bad debts, and none of the financial disturbances embraced in that period has been able to affect the solid foundation on which his establishment rests. Besides the home trade, the business has been largely extended to all parts of the United States, even New England being a large customer. This latter fact cannot fail to be a gratifying circumstance to the citizens of this State. During the panic of 1857, he took advantage of his satisfactory financial position to purchase largely the staple materials of his trade, the prices of which were then very much depressed in the market, and this speculation, entered into with his usual foresight and intimate knowledge of the business, proved very successful. The present condition of the concern is highly satisfactory; its trade has increased year by year, and it enjoys throughout the United States as favorable a reputation as any carpet factory in the country. Many of the causes of this noteworthy success may be traced to the character of the proprietor, and the admirably arranged system he has introduced into his works. He derived from his father a thorough knowledge of the manufacture in all its branches; he possesses an excellent judgment in regard to the markets and prices of material, and is rarely incorrect in his estimates. Perhaps, however, the feature which has more largely contributed to his reputation than any other, is the fact that he confines himself to the making of one full class of goods, and is not ambitious of overstepping that limit; thus creating a specialty of such value as to force recognition. To this may be added another peculiarity, which, in his judgment, has been highly conducive to his prosperity, namely: the personal management of his sales, relying upon no intermediary assistance, and thus rendering himself entirely independent of the New York commission houses.

He was born in Philadelphia, in 1839, and has constantly identified himself with the interests of his native city and State. He was married to Catharine Horner, and has had a family of seven children, five of whom are still living; one, at least, being destined to enter the business. Uniting to a fine personal appearance kind and affable manners, he is yet cool and calculating in business matters, and ranks high among the manufacturers of the State.

WILHELM & NEUMANN, Manufacturers of Lamps, Lanterns, Wilhelm's Patent Reflectors, etc., No. 919 Race street, Philadelphia. This establishment is the oldest of its kind in the city, having been founded by Charles Wilhelm and Joseph Neumann, in 1852, under the firm-name of Wilhelm & Neumann, for the manufacture of street, hall, depot, and other lanterns and lamps; railroad car lamps for oil, coal oil, and candles; also chandeliers for gas, oil, and candles combined. They make lanterns of several patterns and styles, distinguished for their beauty, durability, and efficiency. The display of this firm at the Franklin Institute Exhibition, held at Philadelphia in November, 1874, attracted great attention, and secured for them the highest premium. Among these were lanterns such as they furnished for the great Girard avenue bridge, and also designs for the globe lantern intended for the new bridge also across the Schuylkill river at Fairmount; and the park or pavilion lantern was especially admired for its elegant outline. The entire group exhibited manifested a fine artistic taste for the beautiful, as well as very superior mechanical skill in construction, eminently worthy of the praise they elicited and the distinguished premiums awarded. The firm do a heavy business in this line of goods, shipping them to all parts of the United States, while specimens of their handiwork may be seen in great profusion in this and other neighboring cities. They are likewise largely engaged in the manufacture of bronze, brass, and plated trimmings for railroad cars, etc. The celebrated Woodruff and Pullman palace and sleeping cars, on all the leading lines of roads, are decorated with these trimmings, and their elegance and beauty are well known. The reflectors, invented and patented by the senior partner, are a great improvement over the old style commonly used, and have three times the power of any others. At the Exhibition of the Franklin Institute, already referred to, the silver medal was awarded to this house for the specimens there exhibited. The

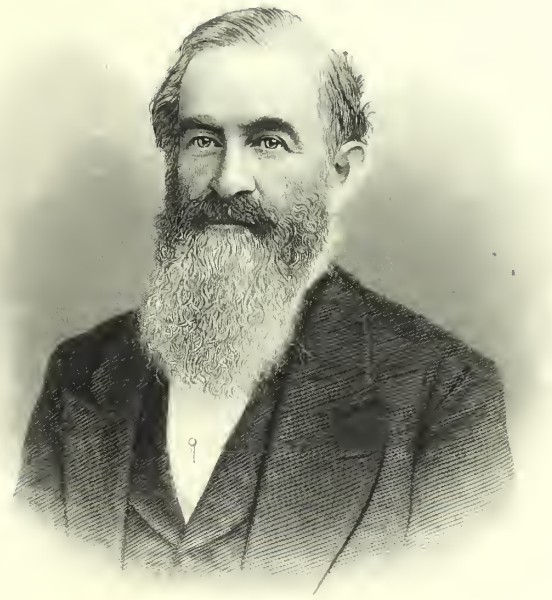
surface of those shown was silvered mica, although any other suitable material may be employed. There is a great demand for these adjuncts to proper illumination, and many prominent churches, halls, and stores in Philadelphia have been supplied with them. The one placed in the late Olympic Theatre, with but twenty burners, gave as much light as if sixty burners had been used in connection with the old style reflector.

JOSEPH NEUMANN was born, September 27th, 1824, at No. 21 Cherry street, Philadelphia: his father was a merchant tailor. In his eleventh year he was apprenticed to Isaac S. Williams, and learned the business of a tin and sheet-iron worker. After passing seventeen years in that establishment, he joined Charles Wilhelm in his present enterprise. He has been connected for many years with the Franklin Institute, the Academy of Natural Sciences, and is a member of the Union League, and the Masonic order. He bears the character of a patient, industrious, and useful citizen.

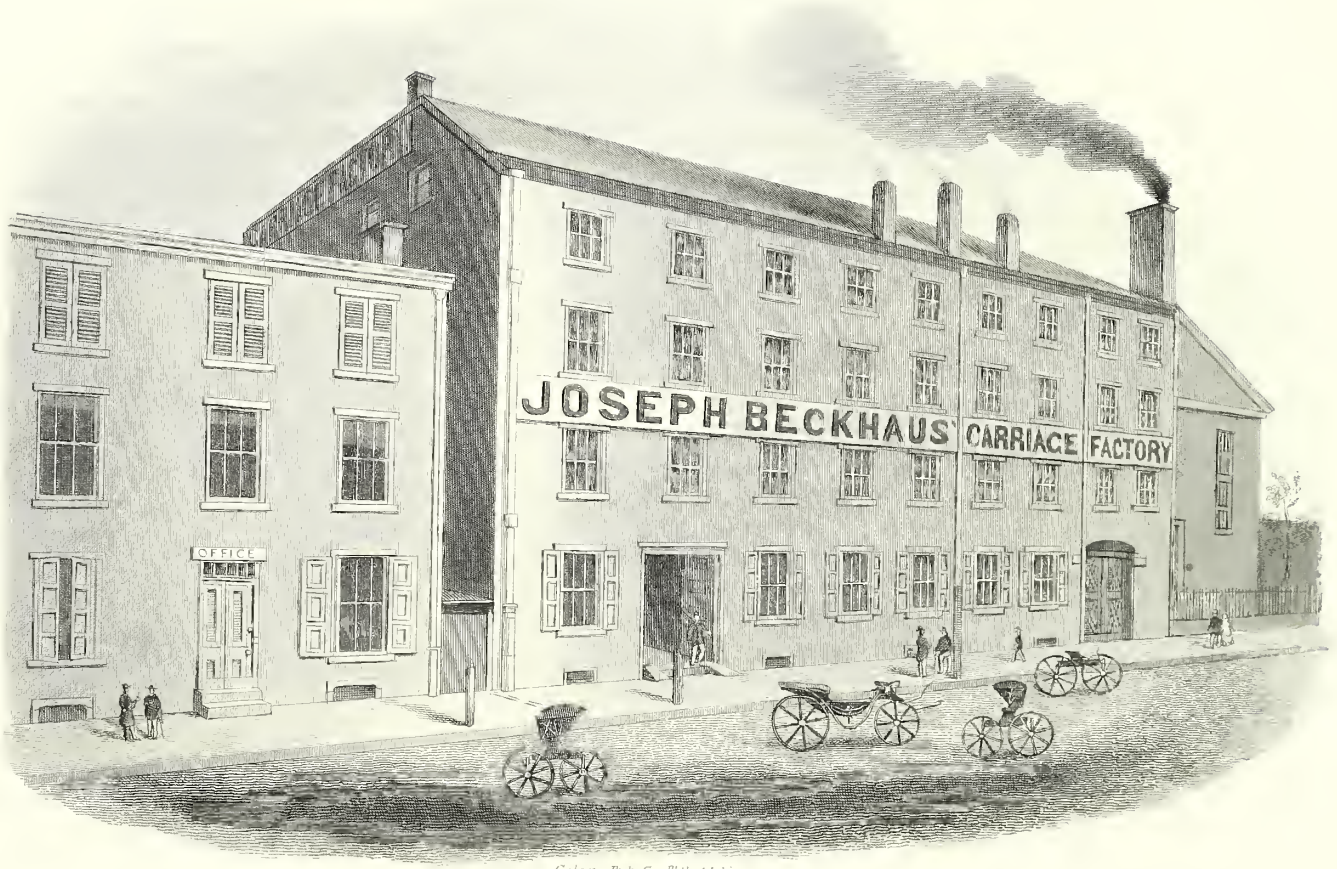
BILLINGTON, JAMES H., was born in the town of Western, Oneida county, New York, February 28th, 1813. His father was a farmer of English descent, his paternal grandfather having emigrated in 1755; at the outbreak of the American Revolution he espoused the patriotic cause, and eventually gave up his life on the bloody fields of Oriskany. On his mother's side he was of German stock, her parents being natives of Brussels, from which city they departed to seek their future home in the New World.

James was the eldest of three sons. When eight years old, his parents removed to Oriskany, where he attended school for about five years. Thence they removed to Whitestown, near Utica; and he was placed in the celebrated "New York Mills," to learn the art of cotton manufacturing. Here he passed the larger portion of eight years, attending closely to his labors during working hours, obtaining thereby a thoroughly practical knowledge of the business. Many of his leisure hours were expended in study and in the acquirement of information on topics of general public interest. He also attended serveral terms at the Academy in Whitesborough, and also at the Oneida Institute, whose principal was Rev. Bariah Green, a celebrated, and perhaps the earliest, advocate of the abolition of negro slavery. In 1834, he was employed by his brother-in-law, A. J. Williams, in the manufacture of wire harness, for weaving, in Oriskany, and thence in three years the factory was removed to Utica, and he continued in the same business in the last-named locality. In February, 1841, he married Lovina Perkins, of Oriskany, and in the autumn of the same year went to New York, where for a year he was engaged in the sale of sperm oil and candles; but the generally unsettled state of business, and the stringency of the money market, compelled his abandoning the same. He became a salesman in a furniture establishment, where he remained two years; and then transferred his labors to the New York Post Office, where he continued to serve for about eighteen months, until, by a change in the administration, he was obliged to quit the position he held. Returning to Utica, he again was engaged by his brother-in-law as travelling salesman of the wire harness, and passed three more years in this occupation. Up to the period of the "Free Soil" agitation, in 1835, he had ever been a consistent Democrat; but at this period saw reason to change his political faith; and, with four others who had become imbued with the same leaven, commenced the agitation of the question in the community. A handbill, of which he was the author, was posted throughout the neighborhood, calling for a public meeting. It was headed "Free speech, free labor, free soil, and free men," and is believed to be the true origin of the motto afterwards accepted by the Republican party.

In 1848, he came to Philadelphia, with the limited capital of $1200, and opened a small store at No. 10 Decatur street. Shortly after, he took in M. H. Emery as a partner. In 1858, he purchased a factory in Cardington, and, together with his other business, commenced the manufacture of Kentucky jean, which he continued for about eighteen months, when he disposed of the latter, and gave undivided attention to his store; in 1859 he bought out his partner's interest, and continued on his sole account. In the Spring of 1862 he removed to 45 and 47 South Front street, where he prosecuted his business with increasing success for four years. On January 1st, 1865, he associated with him his brother-in-law, J. S. Perkins, and a year later, his eldest son, David P. Billington. In 1867, he purchased the site of his present location, 113 Chestnut street, erecting thereon the large five-story and basement brick building, to which the firm removed September 28th, 1868. There are probably but few men identified with the commercial interests of Philadelphia whose eminent success is in a larger measure due to personal industry and unremitting application to the duties of their vocation than the present subject. During the twenty years intervening between



Jas. H. Billington



Galaxy Pub. Co. Philadelphia

Joseph . Beckhaus. Carriage . Factory . Philadelphia

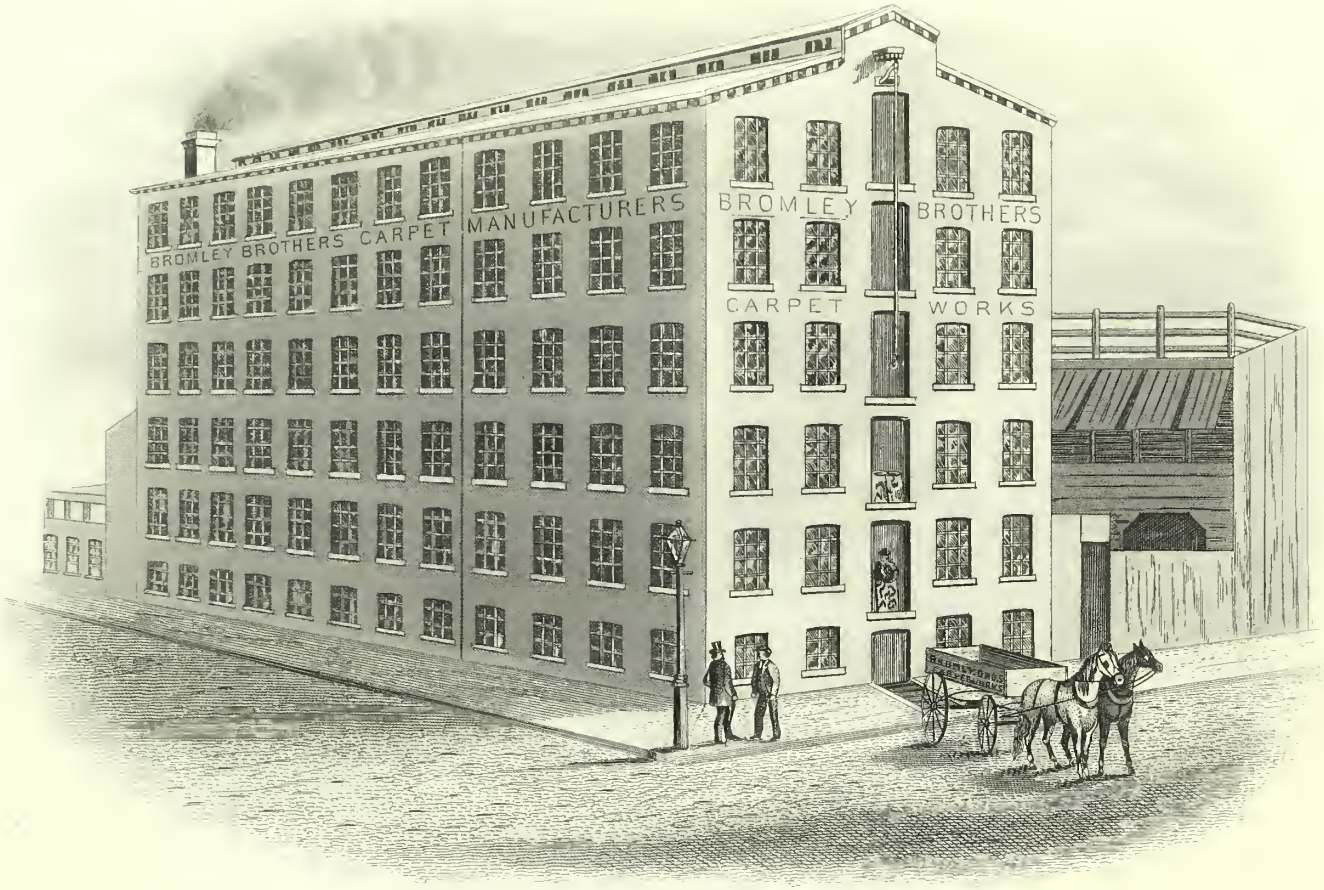
the period of his first venture on Decatur street, in 1848, to the date of his occupancy of the great warehouse of 1868, he has, by persistent individual efforts and toil, built up the business step by step, and accumulated the capital necessary to carry on the same. The warehouse now teems with the largest and most varied stock of manufacturer's supplies to be found in the country. Although he has never sought or desired any official position, yet by his consistent course and fidelity as a citizen, he has won largely the esteem and confidence of the people. In 1864, he was elected as representative of the 20th Ward in Councils, and re-elected in 1866. During his entire terms of service therein he was one of the most industrious members of the body, laboring faithfully for the good of the city. He was the originator of many measures which have proved of incalculable public benefit, among them the bill creating a House of Correction, and also the loan for its establishment; the procurement of League Island as an iron-clad Navy Yard; the Paid Fire Department, and other measures of vital importance. His plan for a re-organization of the Highway Department by the division of the city into eight districts, though defeated at the time, it is believed will ultimately be adopted. During the four years of his incumbency he was chairman of various important committees, and probably of more special committees than any other member. His sterling integrity, steadfast adherence to the right, and his fearless denunciation of every scheme which savored of wrong or useless expenditure of the public moneys, made him a power in the chamber, and won for him a just and deserved popularity among the people. Aside from his political life, he has filled many positions of trust and prominence in various public institutions, and labored assiduously, both with pen and voice, in the advocacy of measures for social and municipal reform.

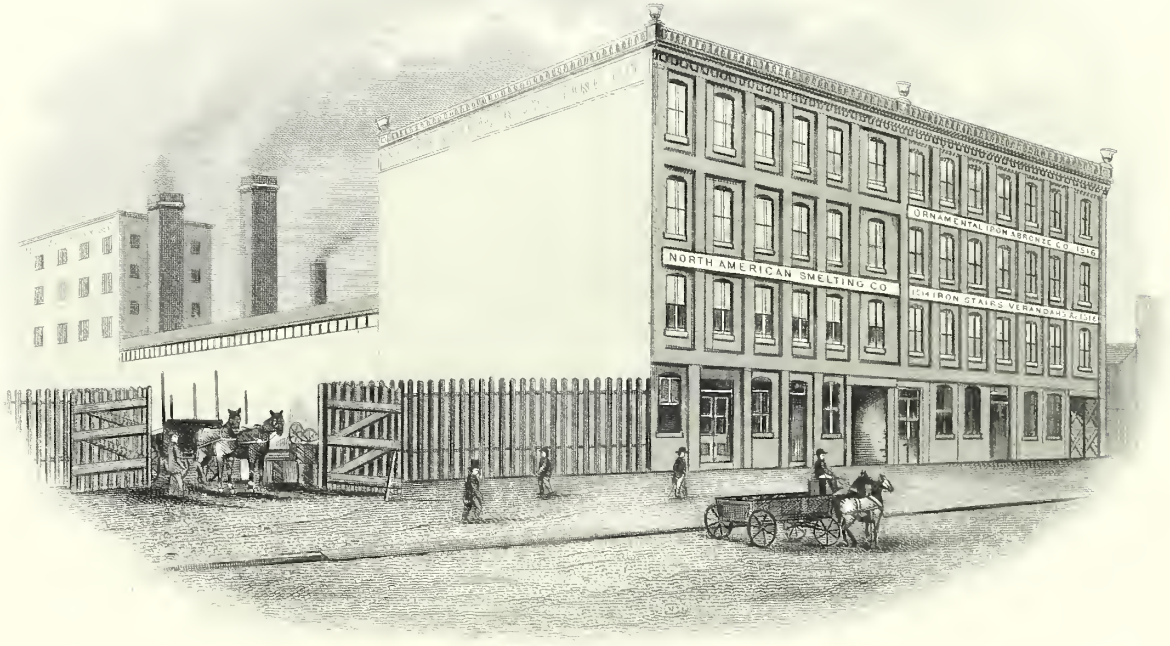
THE BECKHAUS CARRIAGE WORKS, Frankford road, Philadelphia, were commenced, in 1853, by a partnership formed between Joseph Beckhaus and John Allain. They began operations by taking the site of the present factory on a ground rent, and erecting on it a small building, occupying no more than 63 by 34 feet of area. The capital invested in this business by the senior partner was the result of economies he had made while working at his trade as a journeyman in different cities, and was quite limited. The business was, from the commencement, established on a sound basis, and immediately began to assume important proportions, the considerable amount of $30,000 being reached in the first year's sales. The thorough knowledge of the business, and the careful management of the proprietors, led to this unlooked-for success. They did not relax their exertions, and were rewarded by seeing their trade gradually but steadily developed, until it became one of the principal carriage manufactories in the State. With the increase of business, the premises were correspondingly enlarged, until they reached their present dimensions, covering a surface of 100 by 86 feet, while the average sales during the year have expanded to a quarter of a million of dollars. The fine steel engraving accompanying this sketch gives a faithful representation of the extent and appearance of these works. The partnership continued till 1869, when the senior member of the firm retired, leaving his partner in sole charge of the establishment, which, under his able management, has constantly sustained its well-earned reputation for the quality and beauty of the goods made there. This excellence of manufacture, combining elegance with durability, has obtained for this factory a large trade, not only throughout the various States of the Union, but also in many foreign countries, where the superiority of the "Beckhaus carriages" is fully recognized and appreciated. It is, undoubtedly, the special feature to which may be ascribed their capability of excelling most of their competitors. The vehicles built at these works comprise all descriptions, with the exception of wagons and buggies.

JOSEPH BECKHAUS was born on the Rhine, in the Dukedom of Nassau, in 1811, his father being an esteemed and prosperous farmer. According to the law of the country, he was sent to one of the national schools, where he remained till the age of fourteen, when he was apprenticed to a blacksmith, with whom, however, he served but one year and nine months of his time. Following the German custom, he now commenced to travel, working at his trade in the different towns he came to, and in this manner successively travelling through Germany, France, Switzerland and Russia, acquiring that full and thorough experience in his work which proved so eminently useful to him in after life. In the year 1838, his reputation gained for him the important and lucrative appointment of Superintendent of the Royal Coach Factory, at Munich, Bavaria. He retained this position for ten years, laying in a store of knowledge in those finer mechanical arts, used in European carriage building, which gave him advantages not usually

possessed, and proved of inestimable advantage to him in the future. Being desirous of working his own way to fortune, he resolved to emigrate to the United States, where he arrived, with very little money, in February, 1849. By the aid of an interpreter and the use of proper diligence, he soon obtained employment, at Harlem, with a manufacturer named Adams; but his remuneration was very small, his wages not being more than one dollar per day, or about five dollars a day less than that he received at Munich. This being unsatisfactory, he endeavored to better his condition, and succeeded in finding work at Bridgeport, Connecticut, with the firm of Burr & Haigut, where he began to work on piece work, finding that system much more advantageous in a pecuniary sense. Here his talents had fair scope, and his spirit of enterprise found an opportunity for its development in the establishment of a company, organized through his instrumentality, for the building of carriages, under the name of Gould, Reeves & Co. Success was obtained, but his interest in the concern not being adequate to his merits, he resolved to seek another field of operations, and, in 1853, removed to Philadelphia, which has by no means proved ungrateful to her adopted citizen. His financial standing has always been of the highest character, and entirely without stain. From the time when he was earning but one dollar a day to the present, he has never failed to meet any of his engagements, and the monetary troubles through which he, like others, has passed, have never been able to shake his credit. In 1852, he married Miss Graule, of Newark, New Jersey, and by that union has had three children. He is a gentleman of liberal views and generous and charitable nature, qualities which will be readily attested by many of the recipients of his bounty, especially by such of his fellow countrymen as have required his aid. He is courteous and affable to all; is marked by great decision of character, and may serve as a shining example of how a person, from small beginnings, may, by honesty and industry, be exalted to wealth and position.

BROMLEY BROTHERS, Carpet Manufacturers.—This firm is the offshoot of an older one, known as John Bromley & Sons, and was organized in 1868, when the three brothers composing it (James, Thomas and George Day Bromley) retired from partnership with their father, and established the present business. They purchased a property at the corner of York and Jasper streets, Philadelphia (126 by 150 feet), on which they erected a four story and basement building, 47 by 100 feet, with other structures necessary to their purpose, and commenced business. They carried on operations at that place till September 10th, 1871, when their factory was burned down. Machinery, raw material and manufactured goods, were all destroyed, with a trifling exception. On the following day, they rented premises on the corner of Taylor and Coral streets, bought a sufficient number of new looms, and immediately resumed active operations, continuing their business as before. In the meantime they set about the erection of a new factory, on the site of the old one, and had it completed, ready for occupation, in February, 1872. The new building is one story higher than the old one; there are, besides the main structure, a dye house, 47 by 30 feet, a three story drying house, 47 by 20 feet, containing three large boilers of about one hundred horse power, and a three story building for picking, 50 by 25 feet. The interior arrangements are as follows: the basement of the main building is used as storerooms for the raw material; the first floor is occupied by the offices, and adjoining carding rooms; the second story is used for spinning and twisting; the third for winding, shearing, spooling, warping, etc.; the fourth and fifth stories for weaving. They operate 120 looms, four sets of cards, two self-acting and one hand mule, and 1250 woollen spindles; the whole employing upwards of 200 hands, about one-fourth of whom are females. The annual product of this manufactory amounts to nearly half a million yards of carpeting, consuming upwards of 500,000 pounds of wool in the making. The firm, though young, has, since its commencement, progressed side by side with its parent, and among the causes of its success may perhaps be cited the fact, that its sales are all effected directly, without paying a toll to commission agents, and also the judicious distribution of the management into separate and distinct departments. James Bromley, the senior partner, who is eminently qualified by practical experience for that position, has the sole superintendence of the manufacture; Thomas, the second partner, has charge of the sales department, situated at 713 Market street, and George D., the junior member, controls the office and the financial affairs of the concern. The special feature, in which they are able to excel their competitors, is the manufacture of the "Patent Imperial Damask" carpeting, to which they have an exclusive right. This article alone employs from forty to fifty looms, and has an appearance similar to that of the celebrated Brussels carpet. Such, at least, are some of the causes


BROMLEY BROTHERS CARPET MANUFACTURERS
BROMLEY BROTHERS
CARPET WORKS



North American Smelting Company Philadelphia

to which they attribute the rapid development of their business.

JAMES BROMLEY was born in Dewsbury, Yorkshire, England, July 24th, 1829, and attended public school till his father emigrated to this country, in 1841. He served an apprenticeship to his father, at carpet weaving, in Philadelphia, and, having thoroughly mastered the trade, became superintendent of the factory, in 1850, continuing as such till 1856, when he was admitted into partnership, and remained a member of the firm till its dissolution, in 1868. He was married (November 11th, 1862,) to Elizabeth Humphrey, of Philadelphia, by whom he has had one child.

THOMAS BROMLEY was born May 14th, 1835, also in Dewsbury, and accompanied his parents to this country when but six years old. His education was commenced in the public schools of Philadelphia, and concluded in the High School, where he graduated in 1851. On leaving school, he entered his father's factory, where he thoroughly learned the different processes of carpet weaving, and, at the commencement of 1860, became a partner in the firm. On January 10th, of the same year, he was married to A. E. Hendrixon, who has borne him four children.

GEORGE D. BROMLEY, the junior partner, was also born in Yorkshire, January 12th, 1828. His education was partly received at the public schools and partly at the Friends' school, at Rawdon, near Leeds, where he remained till his parents emigrated to the United States. He assisted his father in the factory till the age of twenty-one, when he went into the employment of Joseph L. Jones, in the milk trade, remaining with him till 1853. From that time he carried on the same business for himself, with little interruption, in Philadelphia and Washington, till he joined his father and brothers (1862) in the carpet factory. He was married, January 1st, 1852, to Letitia Arthur, who died ten years later, leaving him a family of six children.

THE NORTH AMERICAN SMELTING COMPANY.—This concern owes its origin to a partnership formed in 1864, between George Hunt and Robert McLaughlin, the former a salesman and the latter foreman in the H. W. Hook Smelting Company. Having, by economy, saved sufficient money (between $7000 and $8000), they bought out the interest of the old firm, changed its name, and began the business afresh, upon a new basis. The senior partner is a man of business ability and perseverance, and the junior possesses a practical and scientific knowledge of the trade, to which he had served an apprenticeship, afterwards working at it as a journeyman. Under the new management, the business rapidly increased, and the works were soon found too small to meet its requirements. They were, accordingly, enlarged to four times their original size, and additional capital, to the amount of $75,000 or $80,000, invested in the concern, which now takes rank among the leading houses in that branch of industry in the country. The principal commodities produced are, type, stereotype, solder, spelter, pig brass, composition castings, antimony, bar lead and tin, all which articles have an established reputation.

The special production consists in the manufacture of Babbit metal, in the preparation of which the company stands first in the United States. Large quantities of this are annually shipped to all parts of the Union, the Dominion of Canada and the British Provinces. Travelling agents are constantly employed by the firm in the different States, and a large force of operatives is maintained at the works to supply the increasing demand for their productions, while the ledger exhibits upwards of three thousand current accounts. The total sales of this large business have risen, in less than ten years, from an insignificant sum to the figure of $140,000 per annum. The dimensions of the factory, at Fifteenth and Spring Garden streets, Philadelphia, as it now appears, are 72 by 210 feet, and a correct idea may be obtained of its external aspect from the steel engraving accompanying this sketch.

GEORGE HUNT was originally a house builder in Trenton, New Jersey. He relinquished that business in 1844, to embark in the furniture trade, in Philadelphia; but, after a trial of five years, finding it unprofitable, he engaged in the lamp and shade business, which he pursued for five years, when he gave it up and began keeping a livery stable. He followed that occupation for nine years, till 1863, then disposed of his stock, and took a situation as salesman in the H. W. Hook Smelting Company, where he met his future partner.

ROBERT McLAUGHLIN, the junior partner, is a native of Ireland, but came to this country when quite young.

THE WINGOHOCKING MILLS took their name from the Indian name of the creek upon which they stand (now called Frankford creek). They were built by Richard and John Garsed, under the firm name of R. Garsed & Brother, in 1853, and were operated by them until April 1st, 1868, when the partnership was dissolved, and Richard Garsed became the sole proprietor. The main building is one story in height, built of stone, with stone floors, and regarded as fire proof; its dimensions are 500 by 66½ feet. There are various other buildings, and the total area covered by the larger buildings exceeds 75,000 square feet. His machine shop is 40 by 70 feet, two stories in height, and employs twenty machinists, who not only repair his own machinery, but also that of other mills. There are three steam engines, of three hundred and eighty, one hundred and fifty, and fifteen horse power respectively, and a large steam fire pump of full sixty horse power, which consume ten tons of anthracite coal per day. The main building contains twenty thousand spindles of the most approved style, which produce six thousand pounds of cotton yarn per day. The cotton is received in the bale, and passes systematically from one end of the building through the picking, carding, spinning and winding processes, until, upon its arrival at the other extremity, it is packed in bales and shipped to its destination. The yarn is sold in dyed or undyed state, as required. The mills employ about 320 hands, and, while the machinery is all of the most approved pattern, the work is executed in a rigidly systematic manner, the movements of the employés being performed with military precision. Since the establishment of these mills, no valuable invention or improvement has failed to find a place there, and, amid the magnificent array of the most perfect pieces of mechanism, are many attestations of the great inventive faculties of the proprietor. The surroundings are attractive and charming; the grounds are beautifully laid out and ornamented with shade trees, flowers, etc., while everything that can add to the comfort or convenience of the employés is secured, without regard to trouble or expense. The steam fire pump, beside filling the tanks with water for ordinary use, is at all times in readiness to be put into operation in a few seconds. In twenty years, it has been out of order but for a single day, and during that period a steam fire engine was on the ground ready for use. At night, hose is attached to the pump and laid along the yards. The most complete arrangements for the smothering of fire by steam can be put into operation in a few moments, and the breaking out of a fire has therefore grown to be a matter of small importance there. These works stand as a monument to the enterprise and energy of the proprietor, who has spent forty-six years in cotton mills, devoting his life to the perfection of cotton machinery and the advancement of manufacturing interests.

THE FRANKFORD WOOLLEN MILL is located on Adam street, in Frankford, Philadelphia, Pennsylvania. It was established in 1827, by Samuel Comly, and was called the Comlyville Power Loom Factory until it was purchased, in May, 1851, from Samuel Pilling, by Joseph Wilde. The present proprietor, Solomon Wilde, is a son of Joseph Wilde, and was born at Middleton, near Manchester, England, in 1825. In 1826, his parents emigrated to America, and settled in Philadelphia. His father established a cotton mill in Kensington, in 1832, and this mill Solomon entered at the early age of nine years. Since that time, with the exception of brief periods at school, he has been constantly employed in the manufacturing business. Joseph Wilde removed to Logan's Mills, on the Old York road, in 1836, and changed his manufacture from cotton to woollens; but, having been burnt out in 1843, he returned to Kensington, remaining there until 1851, when he removed to Frankford and established the above works. He continued to operate them until his death, which occurred on August 21st, 1856. He was succeeded by his son, the present able and efficient proprietor. In 1857, it was found necessary to enlarge the mill, to accommodate the increasing business; and it was conducted with signal success until, on June 11th, 1872, a destructive fire consumed the back buildings, including the boiler and engine house, together with the upper stories of the main structure. With characteristic energy he pushed forward the work of repairing, and within four months the mill was entirely rebuilt, enlarged, fitted up with the most approved machinery and in full operation. The main building is 170 by 50 feet, and four stories in height, while the works include many additional structures, consisting of picker rooms, dye house, engine house, store houses, etc. The machinery consists of a fine steam engine of one hundred horse power, with five plain cylinder boilers, forty-eight feet long and thirty-six inches in diameter, four sets of machines and 100 power looms, with all the necessary preparation and fixtures. About 100 hands are employed and 12,000 yards of doeskin jeans made weekly.

Pittsburgh, Fort Wayne & Chicago Railway Co's Shops, Allegheny, Pa.

THE WISSAHICKON PAPER MILLS, conducted by the firm of Charles Magarge & Co., owe their origin to an old flour mill, situated on the banks of the Wissahickon creek. This property at one time belonged to the Germantown Bank, of which Charles Magarge was President. He offered to buy the mill from the bank for $25,000, provided it was repair and fitted with paper-making machinery. This offer was finally accepted, and in 1847 the property was transferred to its present owners, who at once commenced there the making of paper, which has since proved so successful an enterprise. The business increasing rapidly, it was found necessary to erect more extensive and commodious premises; and accordingly, in 1858, a spacious building was put up, adjoining the old mill, and fitted with a first-class Foudrinier machine, the first used in Pennsylvania, driven by an engine of eighty horse power. In order to secure a constant and abundant supply of pure spring water, large reservoirs were constructed in the neighboring hills and made to communicate with the mill. These improvements cost the firm $80,000, and placed the establishment in a first-class condition. The mill has been in constant operation since that time till the present. One hundred hands are employed, and 12,000 pounds of rags are daily consumed, producing 8500 pounds of paper. In 1858, the main building measured 74 by 54 feet. There is also a room for rotaries, 26 by 15½ feet, extending out on the second story. The machine room is 110 by 28 feet, and it has a wing for calenders, 28 by 15 feet. The engine room is 17 by 40 feet; the boiler house, 40 by 25 feet. Half a mile away is another mill, lately belonging to the estate of Edward Magarge, but now controlled by this firm, where forty-five hands are employed, 6000 pounds of rags consumed and 4000 pounds of paper made daily. It is now proposed to demolish both the old and the new mills, to make way for improvements of the city and the extension of Fairmount. To this the firm have given their consent, and, after receiving a fitting compensation, will establish their manufactory in some other locality. The firm, in connection with their mills, carry on a very extensive business in paper, and are justly considered to occupy the front rank in that branch of commerce. They have, in common with many others, sustained some losses; but, by prudence and good management, have always succeeded in weathering financial storms.

CHARLES MAGARGE was born in Philadelphia, September 30th, 1804, his father being a well-known miller and flour merchant of Philadelphia county and city. His education was obtained in a school kept by a Quaker, where he passed some years, and, in 1820, commenced his business career by entering the store of ——— Hinckle, a ship chandler, and afterwards that of Grant & Stone, commission merchants. In neither of these situations did he receive any wages, and therefore determined to try cabinet carving, which, however, he soon abandoned, returning to the chandlery business, and afterwards engaging in the lumber trade for about a year. He now received an offer of $300 a year, from Isaac W. Norris, which he accepted, and began to save money. Through the influence of his two brothers, he obtained a situation at $500 a year in the store of Samuel Eckstein, paper dealer, where he remained till nearly thirty years of age. At this period, his two brothers resolved to begin business for themselves, and invited him to join them. This he did, and the three young men started in the rag and paper trade, in Minor street, with a capital of some $1500. By their united exertions, they built up the extensive business now carried on in South Sixth street by the present firm. At the commencement, the style of the firm was C. & W. H. Magarge; but Edward, one of the brothers, dying during the infancy of the concern, the name was changed to the one it now bears. The senior partner lives near Germantown, and became a director in the Germantown Bank, and afterwards, in 1848, was elected its President, occupying that important position, by repeated re-elections, till January, 1866, when he resigned, though still remaining a member of the Board of Directors. His resignation was a source of deep regret to his colleagues and the stockholders of the institution, who fully appreciated the prudence and skill with which he had managed its affairs throughout, and more especially the ability he displayed during the severe monetary crisis of 1857, through which the bank passed unscathed. To testify their sense of the loss experienced by his relinquishment of the presidency, the directors of the bank convened a special meeting, on the 16th of January, 1866, at which were passed several resolutions, expressive of their regret at the loss of that officer. These resolutions were ordered to be published, and a copy of them forwarded to the ex-president. The whole of these cannot be quoted, but an extract will serve to show the character he bore amongst his fellow officials. After expressing their sorrow that motives of an "exclusively personal convenience" should have led to this step, they proceed:

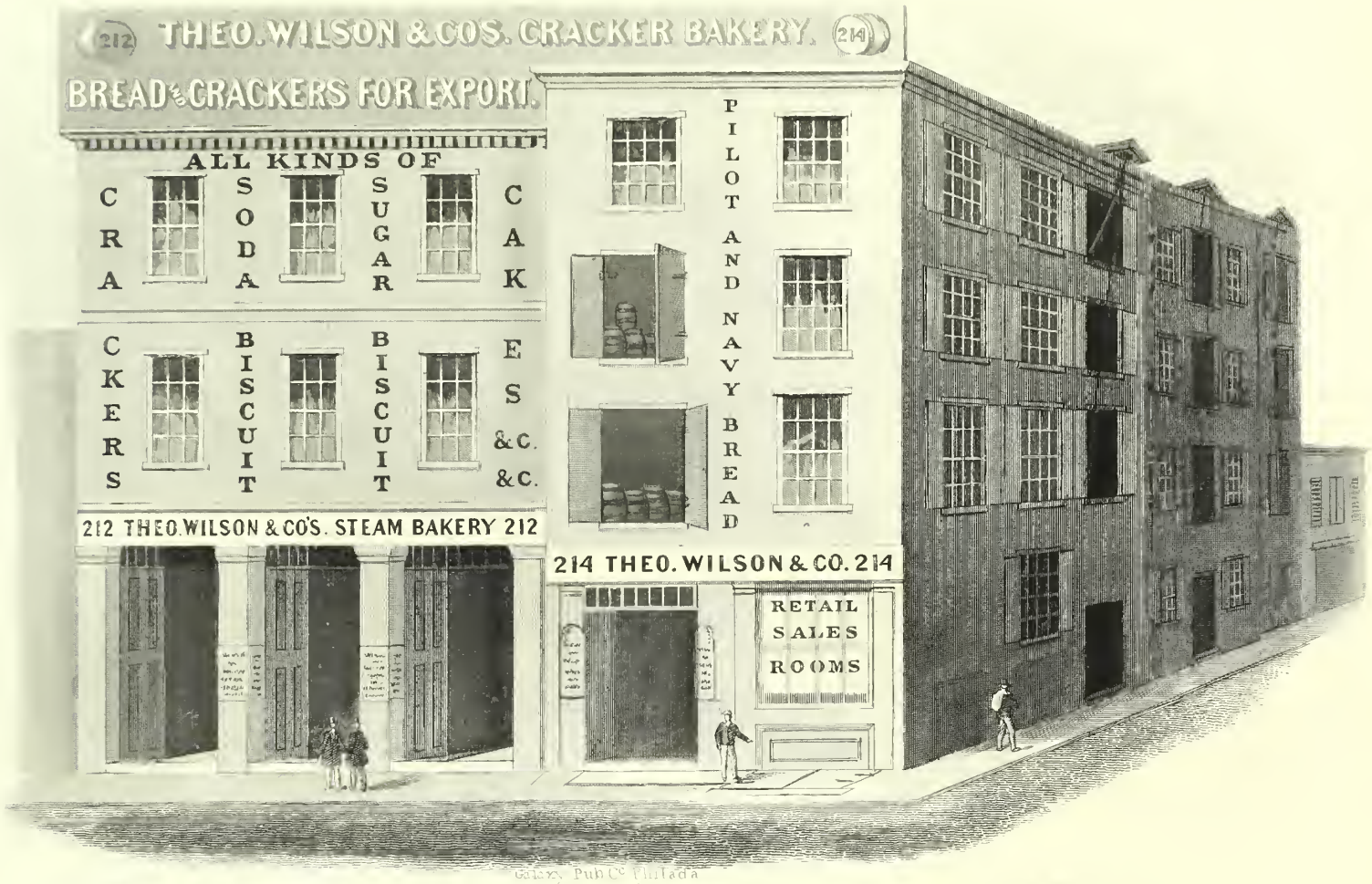
"Ever courteous and affable in his intercourse

with the members of the Board individually, he has presided over its financial dispositions in periods of great monetary embarrassment with signal ability and success. He retires from this Board as an officer distinguished for sagacity, energy and unvarying integrity, and bears with him the high esteem and respect of those so long satisfactorily associated with him" . . .

On the 23d of October, 1834, he was married to Ann, daughter of Charley Hicks. That lady dying, he contracted, on June 5th, 1844, a second marriage with Lydia D., daughter of Matthias Knorr, of Philadelphia. He has two sons, Edward and Henry C. Magarge, the former being a partner in the house, and the latter superintendent of the Wissahickon Paper Mills.

THEODORE WILSON & CO., Bread and Cracker Bakers.—The business of this concern was founded in 1844, but had been allowed to dwindle down till, at the time when the present senior partner of the firm took charge of the office, as clerk, the amount manufactured did not exceed four barrels of flour daily. By judicious management, he considerably revived the trade, and, in 1859, purchased it from the proprietors (Scott & Mason), thenceforward carrying it on for his own account. The breaking out of the war with the South gave an immense impetus to the business, as the proprietor was able to secure a contract with the Government to supply the army with bread. To enable him to do this, he was obliged to provide enlarged facilities, as, at that time, the amount he was under contract to furnish was two hundred and fifty barrels of flour, made into bread, every twelve hours, and these comprehended the employment of a large number of extra workmen. This great pressure of business did not, however, cause him to neglect his regular trade, though he doubtless lost temporarily many country customers, from inability to supply them. At the conclusion of the war, he took his son, Walter G. Wilson,—who until then had been with the army,—into partnership, and this step contributed to largely develop the regular trade, as the junior partner travelled through the States of Pennsylvania and New Jersey, securing new customers and winning back many of those who had temporarily left. On the death of the senior partner, Joseph L. Amer, a former clerk and book-keeper to the house, was admitted into partnership, and the business continued under the same name. Since then it has steadily increased, and is at present in such a position that the firm is able to compete with the large New York houses on their own ground. It has established regular agencies in seven States, and keeps two travelling salesmen constantly out, all the year round, besides having a large casual trade, sent them by dealers who are not their agents. The city trade alone constitutes a very important branch of the business. This is supplied by wagons, and is in charge of the junior partner. Although the machinery is kept running both day and night, orders are frequently on hand for weeks ahead. The firm does a very large West India trade, through New York shipping houses, besides making immense exports directly from their factory, their brands enjoying remarkable favor in those islands. During the war between France and Germany, they took a contract for supplying the French army with bread, which turned out profitably. The machinery employed for kneading the dough and other purposes is of the newest and most approved kind, and their great ovens are capable of baking ten barrels of flour each, every hour. One hundred and fifty barrels are used every day. They now employ one hundred and twenty-five hands, most of whom have been in the establishment for a long time, one of them (the foreman) nearly thirty years. Their rule is to buy all the material required for cash, and, as their purchases are necessarily very heavy, they thus obtain the most favorable terms. Though bread and crackers are the main products of the factory, they are not the only ones, many other articles made of flour being manufactured there.

THEODORE WILSON was born in Philadelphia, in August, 1816. He was the son of George Wilson, a hatter of the same city. He was educated at the school of Dr. Hinchdale, and, on leaving it, was apprenticed to the graving trade, at the corner of Second and Race streets. After serving his term of four years, he went South and engaged as clerk in a general store, in North Carolina, where, however, he remained but a short time. He returned to Philadelphia and entered, as clerk, in the office of Scott & Mason, Front above Race streets, with the results just described. During the war, he was appointed Inspector of Breadstuffs, all such provisions forwarded from Philadelphia passing under his examination. In 1866, he was sent as Treasurer of the Commercial Exchange; three years later was chosen a director in the Commonwealth National Bank, and, in 1869, was sent as delegate to the National Convention held in Louisville. He died in March, 1870, leaving his business to his son.


212 THEO. WILSON & COS. CRACKER BAKERY. 214
BREAD & CRACKERS FOR EXPORT.
ALL KINDS OF
CRA SODA SUGAR CAK
CKERS BISCUIT BISCUIT ES &C. &C.
212 THEO. WILSON & CO'S. STEAM BAKERY 212
PILOT AND NAVY BREAD
214 THEO. WILSON & CO. 214
RETAIL SALES ROOMS

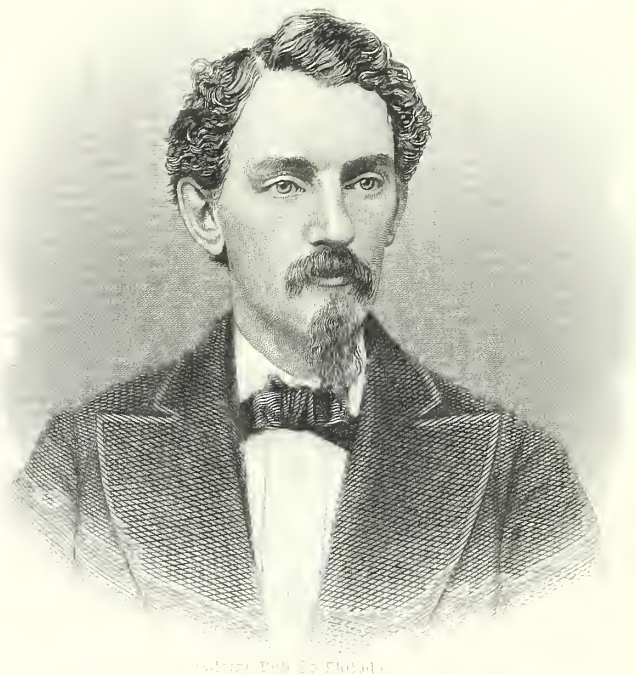
Galaxy Pub Co Phila'a

Theo. Wilson & Co's. Steam-Ship Bread Cracker & Cake Bakery

212 & 214 NORTH FRONT ST. PHILA

Galaxy Pub. Co. Phila.

Theodore Wilson



Isaac J. Wilson

Gutekunst Phot. Pub. Co. Philadelphia

Jos. K. Emmes

WALTER G. WILSON, son of the above, was educated at the Philadelphia Central High School. While still a scholar, the war broke out, and he enlisted, at the age of seventeen, in the corps known as the Anderson Cavalry. He served as a private for twelve months, and was then transferred to the Headquarters of the Cumberland, under Generals Rosencranz and Thomas, where he was employed, for two years, as clerk in the Assistant Adjutant-General's office, discharging his duties so faithfully as to obtain a certificate from General Thomas to that effect. In 1865, he went into partnership with his father. He was married, in 1866, to Frances, daughter of A. W. Butler, of Nashville, Tennessee.

JOSEPH L. AMER, the junior partner, was born in Philadelphia, in 1840. His father, John Amer, was in the hat business in the same city, but removed to Lancaster, Pennsylvania, in 1846. The son returned to Philadelphia at the age of twenty-one years, entered the office of Theodore Wilson, as clerk, and finally became a partner in the house. He was married, in 1867, to Susanna, daughter of John Wehner, of Philadelphia.

MOORE, YORK & HOWELL, Cabinet Makers and Furniture Manufacturers.—The business of this firm was commenced by Thomas H. Moore, March 1st, 1834, at 261 South Second street, and was subsequently extended to 263 and 265, the present location of the ware and sale rooms. After conducting it alone for a short time, he admitted to partnership an old friend, Joseph H. Campion, and the firm assumed the well-known style of Moore & Campion. By strict economy and unflagging industry, they increased their capital and manufacturing facilities, paying especial attention to city trade, in which they acquired a reputation for the excellence and elegance of their work, placing them on a level with any house in the country. This reputation was not confined to Philadelphia, but spread in various directions, particularly to the South and West, as well as to the West Indies, whence they received large orders and with which they soon built up a heavy and profitable trade.

In 1857, Thomas H. Moore erected a five-story factory, with a front of 58 feet, on Levant street, and a large lumber yard in the rear. In 1859, foreseeing the impending crisis, they declined to execute orders from the South unless secured by sufficient guarantees.

As a consequence of this step, they lost the larger portion of their Southern trade, but, as a compensation, made few bad debts. During the whole of the war, their business increased, and has continued to do so to the present time. After enjoying a harmonious and prosperous career of some thirty-five years, the firm of Moore & Campion was dissolved, December 31st, 1870, by the withdrawal of Joseph H. Campion, who was succeeded, January 1st, 1871, by Henry York, who had been for many years the superintendent of the works, with an interest in the profits. Moore & York continued the operations in the same location until February 15th, 1873, when George R. Howell purchased the interest of Thomas H. Moore, and the firm assumed the title of Moore, York & Howell, its present style. The history of this firm has been one of constant progress, and they now stand, deservedly, in the front rank of the furniture manufacturers of the United States. A determination to produce nothing but good articles, and to keep aloof from the manufacture of inferior goods, has probably contributed more than any other feature to enable them to excel most of their competitors.

THOMAS H. MOORE was born in Burlington county, New Jersey, July 15th, 1808. He is the son of a farmer, and his early youth, except that part occupied in attendance at school, was spent in agricultural pursuits. He entered upon his duties as an apprentice to the cabinet making business, with Benjamin Scattergood, at Moorestown, New Jersey, April 7th, 1823. The death of his employer, in 1826, led to his removal to Philadelphia, where he was employed in the cabinet making establishment of John Saylor, at Eighth and Arch streets, until he was twenty-one years of age. He then engaged as a journeyman with Charles H. White, standing at the time at the head of the furniture trade in Philadelphia, and shortly rose to be foreman in his factory, which position he retained until he engaged in business on his own account.

HENRY YORK was born in London, England, March 24th, 1819. He has been a resident of the United States since 1836, in which year he was apprenticed to Gebbard Harris, with whom he remained for six years. He then became a journeyman with Moore & Campion, and, in 1853, the superintendent of the works, continuing as such until his admission into the firm.

GEORGE R. HOWELL is the eldest son of Henry C. Howell, a prominent and well-known merchant of Philadelphia, and was born in that

city, July 6th, 1844. Having been educated in his native city, he engaged as clerk to Thomas Mellor & Co., at the age of sixteen, and continued with them for three years. He subsequently became a salesman for Stokes, Caldwell & Co., remaining until January 1st, 1873. Having always evinced a decided preference for mechanical pursuits, he purchased the interest of Thomas H. Moore in the above establishment.

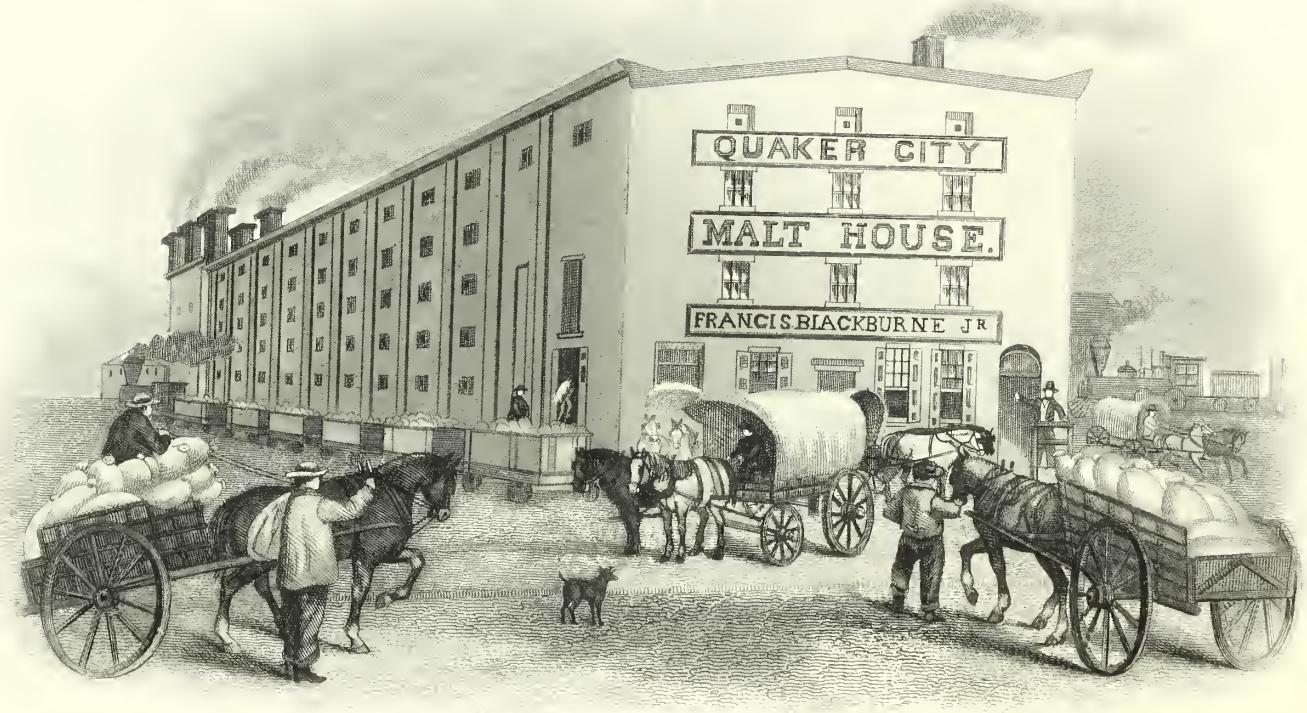
FRANCIS BLACKBURNE, JR., Maltster, was born in Philadelphia, January 26th, 1839. His father, Francis Blackburne, was a native of England, a distinguished Mason, Knight Templar and Son of Malta. He emigrated to this country in early life, and established himself as a merchant in Philadelphia. He was one of the committee on the erection of the Masonic Temple, inaugurated in September, 1873. His son received a fair education, and, at the age of seventeen years, entered the malt house of Peter Hall, as an apprentice. This establishment was, at that time, one of the oldest and largest in the country. By industry and intelligence, he speedily mastered the details of the business, and was soon competent to take charge of it. He had been but a few years in the house, when a financial crisis greatly embarrassed his employer, whose affairs became seriously involved. Appreciating the situation, and seeing the opportunity offered, the young apprentice used his utmost influence with his relations and friends, and succeeded in raising a sufficient sum to warrant his making a proposition of partnership to his employer. This being accepted, the firm of Hall & Blackburne was established, and he obtained control of the business. From the outset of his career, he found many and warm friends, whose advice at that time was invaluable to him, among whom were William Massey and Frederick Collins, good authorities in the malt trade. During the first year of his partnership in the concern, the annual sales amounted to about $50,000; but, under his energetic management, the business rapidly developed itself, and, to meet its demands, more extensive premises were needed. These were furnished by the erection, in the northern portion of the city, of the large building known as the Quaker City Malt House, situated at 1422 North Eighth street, Philadelphia. In April, 1861, the firm of Hall & Blackburne was dissolved by the death of the senior partner, and thenceforward he had the sole control of the business. Being now unfettered, he was able to push the trade to greater extension, and soon found himself at the head of one of the largest malting concerns in the State. He had, however, to contend against serious opposition, as at this time many rival firms, directed by able and energetic men, sprang up; but his business continued to maintain its position, aided, doubtless, by the growing resources of the country, and from the time he took charge of it to the present, its financial standing has never been shaken. The transactions of the house, at first confined to Pennsylvania, were extended to other States, and spread from New York and Boston, in the North, to New Orleans, in the South. In 1870, the manufacture had grown so largely that 300,000 bushels of grain were handled in that year, and, of that quantity, 200,000 bushels were malted on the premises; the work done in the principal establishment being larger than any done under one roof in the State. The amount of sales has steadily increased till, at present, it reaches $400,000 a year. In his operations, he has been efficiently aided by the knowledge and skill of his foreman (Mr. Cavanaugh), the oldest practical maltster in Philadelphia, who has been in the house since 1846. He was married, in 1862, to Emma, daughter of Martin F. Croll, of Philadelphia. He has taken great interest in politics, from conviction, never having sought office or emolument whatever. His business character stands high for rectitude and ability, and his social disposition is courteous, genial and actively benevolent; as a Mason, he has attained high rank.

JAMES E. MITCHELL, Grindstone Manufacturer.—The history of the grindstone trade and manufacture in Philadelphia is so intimately connected with the life of the late James Mitchell, father of the present proprietor of the works, that a brief record of his career appears necessary, before describing the factory as it now exists. The first grindstones imported into Philadelphia were consigned to Joshua Fisher & Sons, in 1796, and since then the chief dealers in the article have been the Fishers, Caleb Price, Samuel C. Bunting and James Mitchell. The latter had a natural talent for manufacturing. He was a carpenter and builder, by trade, but he also manufactured butt hinges (the first made in Philadelphia), wrought nails, and was engaged for a while in the brewing trade. The time when he commenced the grindstone business is not accurately known; but, in 1806, he took up some lots on the northwest corner of Vine street and the Old York road, on which he erected, in

Moore & York's Newly Fire Proof Cabinet Warerooms & Manufactory, Philadelphia, Penn.

Galaxy Pub. Co. Philadelphia.

Thomas H. Moore


QUAKER CITY
MALT HOUSE.
FRANCIS BLACKBURNE JR

Galaxy Pub Co Philada

J. Baugh & Sons. Manufacturers of Raw Bone Superphosphate of Lime

Philadelphia Pennsylvania

1807, 1810 and 1812, the extensive buildings still standing there, using them for the purpose of the sale and storage of grindstones. In 1830, he became the purchaser of the stock of S. C. Bunting, and at that time was the only dealer remaining in the trade, which has, since then, continued almost exclusively in the hands of himself and his successor. Six years later, the business had so increased that he found it desirable to buy the French Burr Millstone shop of J. R. Hassenger, on the Old York road above Wood street, with adjacent lots for storage purposes; and again, in 1838, still requiring more room, he built the storehouse on the Old York road above Willow street, which he occupied for several years, besides having numerous other yards for storage, in the vicinity and elsewhere. In the year last named, he took his son into partnership, with the style of James Mitchell & Son, and, in 1839, the present building (Nos. 310 and 312 York avenue) was erected for the use of the business. The concern thus continued till 1848, when the senior partner retired, leaving his son the entire business, which he still carries on in the building erected by his father, in 1810 and '12. In 1856, a property, situated on Beach above Green street, was purchased, and on it erected, in 1868, the present factory. Its dimensions are 50 by 75 feet, giving, on the ground floor, storage room for about one thousand tons of large grindstones, and on the second floor for two hundred tons of a smaller size, as well as accommodation for a machine shop for making shafts and other fixtures. The motive power is supplied by a twelve horse power steam engine, which drives a lathe capable of turning stones of the largest size (up to 5000 pounds weight) with mathematical precision. At the same time, it keeps in motion a gang of saws for cutting the stones and reducing them to a smaller size. This operation is performed so rapidly, by means of a patent machine furnished with revolving cutters, that seven small stones can be made in an equal number of minutes, with holes exactly in the centre, and perfectly round. It is important that the grindstone should hang exactly true, and this desideratum is obtained by means of lateral pressure, applied to the stone itself. The substitution of the round hole in place of the square, formerly employed, obviates the danger of bursting, which frequently happened on the old plan, with such destructive effects to life and property. The stone comes in the rough, and at this factory is lifted on and off the shafts by means of adjustable tackle connected with the engine. Furthermore, a drilling machine is attached, provided with diamond pointed drills, capable of boring the hardest sandstone with great rapidity. In connection with the above, it will be interesting to mention that the large drinking fountain, at the junction of Wood street and the Old York road, was turned by the steam lathe in this factory, and is, as far as known, the largest piece of circular stone work ever made by steam power. The imported stones are brought chiefly from Weckerly and Liverpool, in England, and Bay Chaleur, New Brunswick, while those from Ohio come from Berea, Amherst, Independence and Massillon. In former times, the grindstones were so small that it was needful to chain them to the wall of a building, to prevent theft; but now the visitor to the extensive depot at the corner of Vine street and Old York road, may see them in large quantities, from the smallest size up to those weighing five thousand pounds, and the assortment is so complete that a customer at a distance need only send a small chip weighing about an ounce, as a specimen, in order to be suited with a stone of any quality or "grit" that he may require. The business requires a large capital, and the factory and storehouses under notice, with their advantageous mechanical facilities, and their immense stock of over one thousand tons from which to select, are not surpassed by any in the country, and probably by none in the world.

THE DELAWARE RIVER CHEMICAL WORKS, operated by Baugh & Sons, Manufacturers of Raw Bone Phosphate and Fertilizers, are located on Delaware avenue, between Morris and Moore streets, Philadelphia. The business was commenced at their tannery, in Chester county, Pennsylvania, in 1855. Previous to this date, the manufacture of super-phosphate, from burned bones, was carried on in a limited way by Prof. Mapes, in New York, and Potts & Klett, in Camden, New Jersey. Edwin P. Baugh, the elder son, had spent more than a year in close observation of the theory and practice used in the production of this article, and he was convinced that a fertilizer made from raw bones possessed superior advantages, also that its manufacture would prove a commercial success. After carrying on about fifteen months at the tannery, it was found necessary to provide enlarged accommodations for the supply of the increasing demand, and they not only extended the original, but established new works at Donnington, Chester county, Pennsylvania. These, in turn, proved insufficient, and, in 1859, they opened a large factory at Front and Dickerson streets, Philadelphia,

shortly after disposing of their works in Chester county, and concentrating their energies upon their Philadelphia establishment, where they engaged in business on a more extensive scale. A few years later, this property proved too contracted, and, in 1867, they purchased the present site, with a frontage of 110 feet on Delaware avenue, and a depth of about 3000 feet, to Otsego street. Upon it they erected one of the most complete works of the kind in the country. The buildings are 464 by 64 feet, and are filled with the most approved appliances and ponderous machinery, much of which is of their own invention. To increase their shipping facilities, they built a wharf, called Pier No. 70 South Delaware avenue, which is usually fully occupied with vessels. They collect their material from all parts of the country, but the bones chiefly from the Western States and South America, and the phosphatic rock principally from South Carolina. Their annual production reaches many thousand tons of fertilizers. The firm were the pioneers in the business of making super-phosphate from raw bones, and they now own the largest establishment operating in that line in the country. Their enterprise has extended to other branches in Philadelphia and Chicago, where they are largely interested in producing supplies for other super-phosphate makers.

The firm consists of John P. Baugh, born in Chester county, Pennsylvania, July 5th, 1797, Edwin P. Baugh, born December 17th, 1831, and Daniel Baugh, born October 22d, 1836. The father, though far advanced in life, is remarkably well-preserved and still actively engaged in the business. The sons devote themselves assiduously to its interests; the younger also edits the *Journal of the Farm*.

THE MIDNIGHT YARN COMPANY was established by the gentleman whose name it bears, in 1860. In that year, he formed a partnership with James Heald, the proprietor of a manufactory at Milltown, Pennsylvania, for the purpose of manufacturing woollen yarns. Shortly after, finding that his partner desired to dispose of his interest, he purchased it, and became sole manager of the business, which increased with such rapidity and profit that the owner of the mill felt prepared to leave it in charge of a relative, and to begin new operations in the city of Philadelphia, where he would be in the midst of his customers. He established himself at the intersection of Germantown road and Girard avenue. In the building, at this point, three new sets of machinery were speedily put in motion, and the prosperity of the enterprise immediately justified the wisdom of its projector. In 1867, W. A. Fleck purchased an interest in the business, and later, in 1870, Jacob Metzger and Frederick Dutt became members of the firm. The three new partners purchased the entire interest of the founder, and at once assumed the management of the concern. Being men of character, energy and enterprise, an unusual degree of prosperity has attended their career. The impetus given to the business was soon felt; additions to the machinery and the number of operatives became necessary; and, while the Philadelphia factory was kept constantly running, that at Milltown showed no less activity, and, in proportion, proved similarly prosperous. A sudden disaster, however, overtook the firm during the first year of its existence. While every opening showed a more and more encouraging prospect, the mill took fire and was burned down, subjecting its owners to heavy loss. They were not, however, men to be discouraged, and, as soon as possible, new arrangements were made; their machinery again was in running order, and their work going on with increased facilities. In three years, the business has grown till it now amounts to a quarter of a million dollars annually. They furnish the different markets, all over the United States, with knitting yarns of admitted excellence, comprising nearly two hundred varieties. Their store, No. 145 North Fourth street, is used as a depot for the shipment of their own goods. They sell no others. Their trade is still increasing, and a new building is shortly to be erected, to furnish such accommodations as its exigencies imperatively demand. Thus, by dint of hard work and perseverance, the company has risen to prominence among the manufacturing concerns of Pennsylvania.

The founder of the concern was originally in the retail hosiery business, and necessarily became well acquainted with woollen yarns, in which he was a large dealer. He came to the conclusion that there was more money in that article than he was able to get out of it, in the retail business, and resolved to take advantage of the first opportunity which should offer of embarking in the manufacture of the same. This opportunity occurred in 1860, when, as before stated, he commenced that business at Milltown.

The senior partner of the present firm served his apprenticeship in a cloth manufactory in his native

country (Saxony), and came to the United States in 1849, when he obtained the position of clerk in an importing house in Philadelphia. A better situation was offered him in New York, where he spent seven years, as book-keeper; but afterwards he returned to Philadelphia, to fill a more advantageous position. During this time he had accumulated some capital, and, judging the investment to be profitable, entered into partnership with S. D. Midnight, his business tact and ability proving highly beneficial to the concern.

JACOB METZGER and FREDERICK DUTT are also natives of Germany, and the great development of the business, since their entrance into the firm, exhibits in a strong and favorable light their excellent business capacity.

DANIEL MERSHON'S SONS, Manufacturers of Heaters, Ranges, Furnaces, etc. —This firm owes its origin to the late Daniel Mershon, who founded the establishment, on Market above Twelfth street, in the year 1840. The capital employed at the start was but limited, being the remnant saved by the founder out of a former business, which he abandoned in 1837, after losing nearly all he possessed in an unfortunate speculation in silk worms. It amounted to but a few thousand dollars, and he entered upon his new enterprise with a force of only about twelve hands. He continued the manufacturing business steadily, increasing it year by year. In 1861, he admitted his eldest son, A. H. Mershon—who had previously been acting in the capacity of book-keeper and superintendent of the works—into partnership. George B. Mershon entered the firm in 1865, about a month before his father's death, and, having been brought up to the business in a thorough and practical manner, became the active superintendent of the works. The business continued to be carried on at the original premises till 1868, when the new and handsome edifice, at present occupied by the firm, was erected. It is built of pressed bricks, is five stories in height, and has a frontage of 106 feet on Twelfth street, and a depth of 40 feet, facing on Filbert street. It is in every respect complete in all the necessary arrangements of the interior, and is one of the most commodious structures of the kind to be met with in the State. It is furnished with a fine thirty horse power steam engine, and supplied with all the machinery requisite for transacting a business of $100,000 a year. The firm has also just completed the building of an elegant brown stone house, of four stories, on Chestnut above Thirteenth street. This is intended for show and sale rooms, and possesses all conveniences for displaying their handsome and extensive stock of goods. They make a great variety of heaters, ranges, etc.; but two articles they pay special attention to. These are: the Confectioner's Candy Furnace, an article never made in this country before its introduction by them, and the Russian Regulator Furnace, for which is claimed a superiority over every other heating apparatus in the world. Its merits must be attested by the amount of demand for it, which is said to be rapidly increasing. They are the representatives in the county for the former; the other is their own patent. The financial standing of the firm is in every way satisfactory, and its business has increased enormously during the past thirty years. The partners are eminently representative men, their business being largely identified with Philadelphia and the State. They are self-made men, and have grown with the city, owing what they have acquired to their own perseverance and energy.

DANIEL MERSHON, the founder of the house, was born in Trenton, New Jersey, January 11th, 1806. He was the son of John Mershon, editor of the *Gazette*. He received his education in the district schools, and, on reaching the proper age, was apprenticed to an ornamental painter, becoming in due time one of the best decorative artists of the day. With a small capital, derived from his father's estate, he began the manufacture of ornamental chairs in Philadelphia, which he carried on successfully till the year 1837, when he was compelled to relinquish it, owing to heavy losses experienced by the bursting of the silk worm bubble. With the remnant of his capital he commenced the business above described, in 1840, continuing it prosperously till his death, January 25th, 1865. He was a man of great energy, always completing what he undertook to do.

ALBERT H. MERSHON was born in Philadelphia, March 24th, 1838. He early entered his father's establishment, where, by his business ability and industry, he soon attained the position of book-keeper and superintendent of the works, and, at the age of twenty-one, received an interest in the concern. At the outbreak of the civil war, he took service under Government, as a member of the Sanitary Commission, and, during his continuance in that office, his faithful attendance upon the sick and wounded, together with the bravery he

constantly displayed on the battle field, won for him the encomiums of his superior officers. He followed the war from the battle of Yorktown to that of Malvern Hill, when he returned home; but shortly afterwards enlisted in the Anderson Troop of Cavalry, and saw active service in the field. At Lexington, Kentucky, he was severely injured by his horse falling on him, and consequently obtained his discharge, in 1863. He, however, again returned to the army, when Harrisburg was threatened by the Confederates, by enlisting in the First Regiment of Grey Reserves, with which he remained till they were mustered out. He was elected a member of the City Council, but declined a re-election, owing to business.

GEORGE B. MERSHON was born in Philadelphia. He entered his father's business at the age of twelve, and became a member of the firm in January, 1865. He acquired a thorough and practical knowledge of the business, and is an invaluable partner in the concern.

FALLS OF SCHUYLKILL WOOLLEN MILLS, John and James Dobson, Proprietors, are located at the Falls of Schuylkill, Philadelphia. They were established in 1855, by John Dobson, who had previously operated in a mill at Manayunk. The original building was 50 by 100 feet, and three stories in height, while the productions consisted of blankets, carpet yarns and carpets, about twenty hands being employed. The founder having subsequently purchased adjoining properties and associated with him his brother, James Dobson, in 1861, extensive additions were made in 1862, '64, '67, '69, '70, '71, '72 and '73, so that the establishment is now (1873) the largest individual enterprise in the United States. The buildings are as follows: No. 1, a six story carpet mill, surmounted by a mansard roof, 235 by 85 feet, which was erected in 1871–'72, and put into operation in November of the latter year; No. 2, of four stories, 140 by 50 feet; No. 3, three stories, 200 by 56 feet; No. 4, four and a half stories, 175 by 80 feet; Nos. 5 and 6, each four stories, and 90 by 56 feet; No. 7, two stories, 150 by 60 feet; No. 8, three stories, 100 by 40 feet. To these are added all the outbuildings necessary to the successful operation of the vast concern. The motive power for the carpet mill is obtained from a pair of magnificent compound beam engines (the only ones used in a woollen mill in this country) of 600 horse power, built at the People's Works, Front street and Girard avenue, Philadelphia. They are driven by four batteries of three boilers each, and run twenty-two sets of cards, besides seven Lyster combs for combing wool to supply twenty-six spinning frames of 144 spindles each, together with all the necessary drawing for the manufacture of worsted yarn, all of which is consumed by about 200 looms. In the blanket mills are three engines, two of 250 and one of 40 horse power, driven by sixteen cylinder boilers, three feet in diameter, arranged in six sections. This force serves to run 140 looms, twenty-nine sets of cards and necessary side machinery. In the cloth mill, a 40 horse engine, propelled by four three-deck tubular boilers, disconnected, runs 30 looms, five sets of cards and other machinery. They have also an engine for propelling the machinery for box-making, carpenter work and repairing. All their machinery is superior in pattern and quality, while some portions are without equals in America. They consume 600,000 pounds of cotton warps per annum, and more than 20,000 pounds of wool daily, one-third of which is used in the production of carpets, and the remainder in blankets and cloths. They employ 1400 hands at a monthly expense of about $50,000, and produce daily about 6000 pounds of blankets of all sizes and qualities, lap robes and rugs, for which Wilson & Bradbury are the agents in Philadelphia and New York; 500 yards of all wool and cotton warp Chinchillas, Elysian, Raye coatings, etc., for which William C. Langley & Co., of New York, are the agents; 3500 yards of Axminster, velvet, body Brussels, tapestry Brussels, three and two ply ingrain, extra superfine, superfine, extra fine, fine, medium and all wool duck carpets (a special branch of their productions), which are sold at their warerooms, at Ninth and Chestnut streets, Philadelphia, by W. Olding Newman. They also make blue, green, and scarlet, all wool, Saved List Cloths for the Indians, which is a feature successfully introduced by them alone. Every possible convenience is provided for the comfort and safety of the employés, and there are two large steam fire pumps in constant readiness for use. The manager of each mill receives, in addition to his salary, a percentage upon all the products of the department under his control, having thus an interest in its profitable management, and being essentially a partner.

The firm are importers as well as manufacturers, purchasing their wool at Constantinople and at various points on the Mediterranean and Black Seas as well as in Mexico and Texas. They take the material in a raw state and send it out as fin-

ished goods, even making their own packing-boxes and doing their general carpenter work, blacksmithing, and repairing.

JOHN DOBSON has also owned and operated for five years, under the management of his brother-in-law, Thomas Schofield, the Rockhill Mill, at West Manayunk. It is propelled by steam power, contains five sets of machines and all the necessary preparatory and finishing machinery for the production of skirts, jeans, etc.

BOTH the proprietors are natives of Oldham, England, where they each entered the mills at eight years of age and were thoroughly educated to a practical knowledge of their business. An illustration of their active energy is afforded in the fact that one of their largest structures, destroyed by fire, May 14th, 1869, was rebuilt, refitted with machinery, and running by the following October. Their success has been unprecedented, and within eighteen years their business has grown to an annual production of about $4,000,000 worth of goods. With a still rapidly increasing demand, the capacity of the mills is constantly enlarged. The superior excellence of their manufactures is attested by the fact that they have been selected to make the rich carpetings for the United States Senate chamber, both houses of the Pennsylvania Legislature, the Government Offices in Philadelphia, all the vessels of the American Steamship Company, and many other public institutions, as well as to supply immense quantities of their superior blankets, etc., to the Army and Navy Hospitals and other public and private institutions.

POWHATTAN MILLS, Chester, Pennsylvania, Shaw & Esrey Proprietors. In December, 1863, Hugh Shaw and D. R. Esrey associated in partnership as Shaw & Esrey, and purchased the machinery with all the rights, property, interest, and estate of Patrick Kelley in the Pennelton Mill, on Chester creek, at Bridgewater. The mill, which was owned by Isaac Morgan, contained three sets of woollen machines and 48 looms, driven by water power and a small engine. They went into operation, January 1st, 1864, employing 59 hands, and turning out about 400,000 yards annually. Having erected No. 1 mill upon the present site and removed the machinery from the original mill in the summer of 1866, they added a new set of woollen machinery and got to work in September. In this mill they added an additional set in 1867, and another in 1872. The basement is rented to two parties, one of whom is engaged in spinning cotton yarn and the other in weaving cotton cloths. They erected No. 2 mill in 1871, immediately set up four sets of woollen machinery, and in 1872 added two more, making a total of twelve sets in both mills, beside ninety-four fast clipper looms in No. 2, ninety-eight looms of various kinds in No. 1, and all the necessary side machinery. Each mill derives its power from a fine eighty horse Corliss engine, driven by six boilers with one hundred and fifty horse power. No. 1 mill is three stories in height, 178 by 55 feet, and to it is attached a two story dye house 30 by 55 feet; while there is also a detached boiler house 32 by 16 feet, and all other necessary outbuildings. No. 2 mill is also a three story building 115 by 58 feet, and to it are attached engine, boiler, dye, and dry houses, forming a wing 150 by 33 feet, and giving an L shaped building. The works, including thirty-three comfortable two and three story houses, erected for the convenience of their employés, cover about twenty acres of ground. They consume 1300 bales of cotton, 450 pounds each, 16,800 pounds of wool, and 187,200 pounds of cotton warps, and turn out 1,800,000 yards of three and five-leaf jeans of various weights and standards per annum. They employ 168 hands, and the machinery in use of the most improved style. An admirable system pervades the establishment, and everything that can contribute to the progress of their manufacture or the welfare of their employés is secured without regard to trouble or expense. The arrangements for extinguishing fire are unsurpassed, water and steam being introduced into every room for that purpose. There is a steam fire pump at each mill in constant readiness for use, with seven hundred feet of hose. Every room in No. 2 is also supplied with sprinklers, and the whole could be flooded in a few moments from their large reservoir. The proprietors have fairly earned the brilliant success that has crowned their efforts. It is noteworthy that in all their business career they have never given a note, having always confined themselves strictly to a cash basis.

HUGH SHAW was born in England, December 2d, 1823. Having entered the mills at the age of seven years he enjoyed only limited educational advantages, obtaining instruction principally in night schools, from contact with others, close observation and research. He continued as a spinner until 1843, when he came to the United States and entered the mills of W. T. Crook, at Crooksville,

Delaware county, Pennsylvania. Here he subsequently became foreman and so remained until 1854, when he engaged in farming in Chester Township, which he pursued until the purchase at the Pennelton Mills. His life has been devoted to his own legitimate pursuits, and he has never yielded to the flattering inducements of doubtful enterprises.

DAVID REESE ESREY was born in Ridley, Delaware county, Pennsylvania, December 4th, 1825. Being raised on a farm he attended the common schools, but is principally self-educated. He left the farm in 1844, and became a clerk in a country store, where he purchased his employer's interest in September, 1850, and continued a successful career until March, 1866. Then he left the store, and has since devoted his energies to the manufacturing establishment in which he had been interested for some years previously.

THE AMERICAN BUTTON-HOLE, OVERSEAMING AND SEWING MACHINE COMPANY, of Philadelphia, of which W. B. Mendenhall is President, and George Rehfuss, Superintendent, owes its origin to the genius of the latter, who is the inventor of the machine which gives its name to the establishment. It was started in 1862, as a joint stock company, with a capital of half a million dollars, and commenced operations, by the sale of a sufficient number of shares to raise the sum required for securing the necessary patents and providing a working capital for the concern. It went into operation in premises, situated at Broad and Buttonwood streets, which, however, were only regarded as experimental and temporary. During the first year, the business was comparatively small; the hands employed not being more than forty to fifty, and the number of machines manufactured, in that period, not exceeding from four to five hundred. The want of the community, namely, a machine capable of doing plain sewing and also button-hole stitching, had not yet been reached. This desideratum was obtained in 1864, when the company introduced their combination machine, an instrument remarkable for the simplicity and ingenuity of its movements, which enable the operator to change it almost instantaneously from the plain sewing to the button-hole-stitch, and *vice versa*. The introduction of this machine gave immediate impetus to the business. Two years later, in 1866, the company was compelled to seek more commodious quarters, and a property was purchased at the corner of Washington avenue and Twentieth street, the present location of the factory. Its condition is highly satisfactory; the business has largely increased, the number of hands constantly employed being about 500, and the capital of the concern has swelled to $1,000,000. The premises are very extensive, having a frontage on the avenue of 280 feet, and one, on Twentieth street, of 160 feet, with a uniform depth of sixty feet. The machine shop is filled with numerous planing, grooving, stamping, drilling, milling, and polishing machines, constantly kept in motion. These are propelled by a Woodruff & Beach engine of sixty horse power, and require the attendance of forty workmen. In the forge room are several trip and drop steam hammers; also, a very delicate piece of mechanism used for cutting the shuttle springs. On the second floor are the machines for grinding and polishing the hand steel rollers, also revolving head screw machines, and several others employed for making cams. There is also a machine for making the long spiral springs, out of steel wire, which function it performs with great rapidity, with many others of ingenious contrivance. There are also painting, ornamenting, and japanning rooms, in which are carried on the various processes of ornamentation, among others the curious one of transferring designs, prepared upon a card, to the machines, by means of copal varnish. Next come the fitting and "tuning" rooms, where the machines are put together, tested for several days and thoroughly inspected, preparatory to being packed. The establishment is now producing about 125 machines a day, or upwards of 45,000 per annum, and the demand is so great that there are seldom in stock more than 500 unordered machines. Strange as it may appear, the best market the company has, is in the New England States —the birth-place of the sewing machine—a flattering testimonial to the superiority of Philadelphia workmanship. The company manufactures five different species of machines, viz.: the "family," or combination, the "leather," "shoe," "heavy cloth," and finally, the carpet sewing machine. This latter is the only one of its kind in the world. It is locomotive, and runs along a room, sewing together, as it advances, the breadths of carpet, being propelled by the operator with perfect ease. Some years ago, the house of A. T. Stewart & Co., of New York, had eleven of these machines in use. They have also been in use in Philadelphia and elsewhere. The special feature of the business, to which the managers attribute its success, is the superior excellence of their plain sewing machine, the simplicity of its construction, and the ease with

which it can be worked, also the fact that their machines do carpet stitching, overseaming, and glove stitching, which can be done by no others.

THE inventor of this machine is a native of Wurtemberg, Germany, and was born, October 4th, 1826, his father being a tanner. He received his education in Switzerland, and, after completing it, served a term of five years to a machinist in that country. He, afterwards, continued to work on sewing machines, for seven years, and, in 1853, emigrated to the United States. From that time he was principally engaged in working upon knitting and sewing machines, until 1863, when he obtained his first patent for a sewing machine. Though not a prominent politician, he is a steadfast Republican in principle, and firm in the cause of the Union. He was married in 1853.

JAMES SMYTH'S BREWERY.—The buildings for this brewery were erected in 1866–'67, and are of a very extensive and complete character. They are situated at the corner of Twenty-first street and Washington avenue, Philadelphia. The main building is two stories high. The frontage of the premises, on the latter street, is 180 feet, while they run back, a depth of 130 feet, to Alter street. The interior arrangements are of the most convenient and complete character. On the first floor are situated the offices and also extensive bins for the storage of malt, having a capacity of 20,000 bushels, and eight immense tuns are also placed upon the same floor. The brewery is provided with an engine of twenty horse power, and a Harrison boiler, of fifty horse power, which provides sufficient steam for boiling the liquor, while one of Wissman's patent coolers is used for cooling it. The cellars are cold and spacious, eighteen feet below the level of the street. The one devoted to "present use," or fresh ale, is 100 by 30 feet, and that where the "stock ale" is kept is 100 by 40 feet, in dimension. The mash tub is placed in the upper story, and is capable of manufacturing 250 bushels of malt a day, while the boiling tub has a capacity of 350 barrels. In the rear is situated the cooper shop, for making and repairing barrels, etc., and the fine commodious stables, two stories high, with ample accommodation for forty horses. In addition to these premises, the proprietor has a malt house, at Pear and Dock streets, four stories high, with a capacity for making 25,000 bushels of malt. This latter has been in operation for sixty or seventy years, and was purchased by the present owner about six years ago. The business of this brewery has been steadily growing and is now very extensive, the number of barrels of ale and porter sent out from it during 1872 amounting to 15,000.

CHARLES B. WILLIAMS' SONS' TANNERY.—This establishment was founded in Philadelphia over twenty years ago, by the father of the present proprietors. In 1851, he purchased a part of the property now held by the firm; the dimensions of the ground occupied being 128 by 200 feet, on Fifth street below Columbia avenue, where operations are still continued. The business progressed steadily, year by year, until it was found desirable to extend the surface of the premises, for which purpose adjacent lots were purchased, so that the ground now occupied by the works covers an area of 198 by 200 feet. The production of this establishment is exclusively confined to sole leather. It is supplied with all the modern improvements and appliances, in machinery, etc., and steam is employed in the process of tanning. It has a capacity for producing 12,000 sides of leather annually, and is worked nearly up to its full force. The number of hands, regularly employed, is about twenty. The only kind of bark used in the operations is oak, and, of this, more than 1000 cords are consumed every year, the supply being derived chiefly from Delaware. The buildings, vats, tanks, machinery, and other necessary appliances are all on a large scale, and the annual product is set down at over 10,000 sides of leather. The utmost care and attention are used in the manufacture, and none but the superior grades are made. By this means, a wide reputation has been obtained by the firm, and their leather meets with a ready sale at all times, the business constantly increasing.

CHARLES B. WILLIAMS, deceased, the founder of the concern, was born in Philadelphia, in 1803. He was of English descent, his ancestors having emigrated to this country in the early part of the last century. His father was also an extensive tanner, at one time the largest in the city, owning several tanneries, the principal one being at the corner of Front and Poplar streets, where his son was born. The latter received a good English education, in private schools in the city, and afterwards entered his father's establishment, where he acquired a thorough knowledge of the art of tanning. In 1823, his father failed and he was

thrown upon his own resources. Not discouraged at this misfortune, he began to work as a journeyman, continuing to do so, in the various tanneries of Philadelphia, for about ten years. Though his wages were small, he succeeded, by economy, in saving sufficient money to enable him, in 1833, to enter into partnership with Dr. Benjamin Burton, in the tanning trade, at the corner of Otter street and Germantown road. Here he continued till 1836, when he rented a place from George Laws, at the corner of Seventh and Willow streets, remaining there till 1851, when he purchased a part of the site of the present buildings. His ancestors, for many generations, have been Quakers, and his business transactions have always been marked by the strict morality of that sect. He was never a politician, and rose, by his own exertions, from the situation of journeyman to the enjoyment of a competency. He was married, in 1830, to Sarah Coates, of Philadelphia, and died, November 15th, 1870.

ISAAC C. WILLIAMS, the eldest son of the above and senior partner in the present firm, was born in Philadelphia, July 1st, 1833. His education was received in Philadelphia and Germantown, and, at nineteen years, he began to learn his father's business. In 1858, he was admitted as a partner.

THOMAS and A. C. WILLIAMS, were born, respectively, November 3d, 1837, and March 13th, 1841. Their education was similar to that of their elder brother. They both learned the business with their father and, in 1861, were taken into partnership, continuing so till their father's death, when the present firm was formed.

ISAAC STEAD, Manufacturer of Reps, Terries and Cassimeres, Philadelphia, commenced his present business in 1863, with a very limited capital, the result of his untiring industry and economy whilst working for others. He began by renting two floors in a building at the corner of Sixth street and Columbia avenue, where he undertook the spinning of woollen yarns, employing at first only about 600 spindles. While there, he experimented with one loom, in the manufacture of rep and terry fabrics, with complete success. Very shortly after, he opened a branch factory at Ninth and Wallace streets, operating 720 spindles. He transferred the ownership of his former factory to his brother; but, in 1865, it was burned down. In 1867, he commenced the manufacture of rep at Coral and Adams streets, at the same time transferring to his brother the machinery of his second factory, which also was burned about two years later. In 1869, he purchased the site of his present factory, at the corner of Taylor and Coral streets, where his business has increased to its present dimensions. Before starting in the manufacture of reps, he experienced much difficulty in procuring the necessary information, from the unwillingness of others to instruct him; but, by perseverance and some strategy, he finally succeeded in obtaining it, and fully mastered the art in all its details. The rapid development of his business will be appreciated by the following figures: In 1868, the product of his looms amounted to $150,000; in 1869, to $295,000; in 1870, to $350,000; in 1871, to $308,000, and, in 1872, to fully $600,000 annually. This surprising increase, in the brief space of ten years, and principally in the last half of that period, must stand as a proof of the great mercantile ability and mechanical skill of the man who brought it about by his unaided efforts. The grounds on which the present factory stands have an area of 56,100 square feet. The main building is of brick, five stories in height, including a basement, and covers an area of 132 by 46 feet. The basement is chiefly used for finishing the fabrics, the first floor for yarn-doubling and weaving, while the second, third and fourth are employed for spinning and carding purposes. In the rear, and attached to this building, stands the picker and drying house (64 by 22 feet), and of the same height. Adjoining it is a two story dye-house, covering 80 by 22 feet, the upper floor of which is also occupied for weaving purposes. At about a square distant, two floors of another building are rented (162 by 46 feet) for manufacturing uses. He operates, in his factory, 1820 woollen spindles, 1238 doubling and twisting spindles, two sets of cards and 76 power looms, the whole propelled by an engine of 80 horse power. The number of operatives, male and female, employed at the works is 250, while the annual product amounts to considerably over half a million of dollars.

THE proprietor of this vast establishment was born in New Garden township (now Chandlerville), Chester county, Pennsylvania, May 18th, 1828. He is the youngest son of John Stead and Elizabeth Danbruf, both natives of Yorkshire, England. His father emigrated to this country in 1821, and the following year sent for his family. His parents first settled at Philadelphia, remaining there and in its vicinity for some time. They then removed to New York State, but afterwards returned to Pennsylvania, and settled at New Garden. His

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Isaac. Stead

Henry Kesler

father engaged in partnership with some others in the woollen manufacture, in Delaware county, Pennsylvania, but was unsuccessful and lost all he possessed, thus placing his family in actual want. After various wanderings and vicissitudes, he himself settled down in Manayunk, employed by George Sutton & Son as a wool carder. His education had been much neglected, but he strove in his leisure hours to remedy this defect, with profit. He was employed in various factories till 1858, when he was sent to Georgia to superintend a woollen factory there, and ultimately was taken into partnership by the owner, James R. King, in October, 1858. Preferring, however, to reside in Philadelphia, he returned there, and, after being employed in city factories till 1863, began business as stated above. He was married, September 6th, 1849, to Melinda Brown, of Philadelphia, by whom he has had three children.

KESLER & DELANY, Manufacturers of Glue and Curled Hair, Philadelphia.—The origin of this firm dates back to 1835, when the senior partner, in conjunction with Thomas McRea, purchased the site of the present factory and erected thereon two stories, still standing, of the main building. At that time they engaged in the manufacture of wheat starch, carrying on the business for about six years, with moderate success, till the extensive production of this article from corn, in the West, rendered the enterprise unprofitable. Thomas McRea then retired, and died shortly afterwards. A partnership was immediately formed between Henry Kesler and Joseph Smith, for the purpose of manufacturing glue and curled hair. The building was remodelled, raised to its present height, and other alterations made, to suit it to its new use. The business was continued by those partners till 1865, when the junior sold his interest to Theodore M. Delany. From that year, therefore, the operations of the actual firm may be said to date. For some time it met with discouragements and drawbacks; but, by persistent application and a determination to make nothing but a first-class article, these difficulties were overcome, and the demand for their goods increased to such an extent that it became necessary to establish a branch house in New York, for sales and for attending to the direct importation of the raw material, which they entered into largely. This department is in charge of the junior partner. The stock imported consists of hide cullings and tail and mane clippings of wild horses, derived mainly from the Rio Grande, Buenos Ayres and Montevideo, packed in ceroons of 1000 pounds each. The factory is situated at the corner of Hancock and Jefferson streets, Philadelphia. The lot on which it stands has an area of 16,000 square feet, nearly the whole of it being covered with large buildings or sheds. The main building is four stories in height, and 35 by 85 feet in area, and is used as follows: The basement is occupied by boiling apparatus and vats for cooling the glue; the first floor is chiefly used for mechanical purposes, both in glue and hair, and the remaining stories and the roof are utilized for drying, being constructed so as to admit a free current of air for that purpose. The engine and two immense boilers, with cross boiler, are contained in a supplemental structure in the rear. In another building (two story and basement), on the lot, are placed the vats (about 100) for preparing the glue stock, the other portions of it being applied to the storage of material and drying. The offices and buildings, for general purposes, cover the rest of the ground. There is still another erection adjoining the property, which is used as a warehouse for storing the raw material. The yearly products of this factory are now about 300,000 pounds of glue and 400,000 pounds of curled hair, while the average number of hands employed is seventy-five. The firm make no inferior goods, and they attribute to their care in that respect the large measure of success they have achieved.

HENRY KESLER was born in Philadelphia, in August, 1812, of German parents. Both his parents dying when he was very young, he went to live with a gentleman who took charge of the small property left him by his father. During this time he had few opportunities for education, but by after exertions, during leisure hours, he to a great extent remedied this deficiency. He was afterwards apprenticed to Thomas Craig, a saddle and harness maker, with whom he served his time and worked for two years as a journeyman. On the attainment of his majority, his small patrimony (about $450) was given him, and, in 1834, he was married to Eliza, daughter of Thomas McRea, his future partner in the starch manufacture. In 1857, his wife died, leaving two children, and about two years later, he married Deborah Dungan, of Philadelphia, by whom he has one child. He has now reached his sixty-first year, but is still hale and hearty.

THEODORE M. DELANY was born in Philadelphia, in 1839. He is the son of Charles Delany, a former partner of Charles Baeder, and also a

manufacturer of glue. After graduating at the High School, he was placed in their counting room, where his good qualities gained their confidence. He was sent to New York as head book-keeper of the house there, and afterwards had the entire management of the business in that city, which he retained till he formed his present connection.

ROYER BROTHERS' Builders' Iron Foundry, was commenced by the four brothers now composing the firm, on Ninth street below Girard avenue, Philadelphia. They had no previous knowledge of the foundry business, being mechanics; but, by perseverance, industry and native ability, soon became successful. They remained in that location about ten years, when, finding their accommodations too limited, they purchased the site of their present factory, erecting thereon the buildings as they now stand. They are situated at the northwest corner of Ninth street and Montgomery avenue, are 150 by 142 feet, and on one side contiguous to the Philadelphia & Reading Railroad. Although the work is chiefly performed by hand, they, nevertheless, require an engine of ten horse power to propel the machinery they use. All kinds of iron work can be turned out here, and are so occasionally, but they make a specialty of architectural work, and many of the finest buildings in the city exhibit specimens of their productions. The firm not only manufactures for the city trade, but has supplied builders in various parts of the country, as Wilmington, Delaware, Washington, New Brunswick and elsewhere. Their reputation is now so widely spread that their business appears destined to still further extend in every direction. The iron is brought to the factory in pigs, and passes through all the different processes required, on the premises, the brands chiefly used being the "Leesport" and "Thomas." The direction of the manufactory is undertaken by the four partners, each one assuming the control of a separate department. Thus, one takes charge of the pattern shop, a second directs the foundry, a third attends to the fitting, while a fourth superintends the offices and finances of the concern. This division of labor has had the most beneficial results, and been instrumental in placing the establishment on its present prosperous footing. The number of hands at present employed is about seventy-five, while the annual amount of business transacted reaches $100,000, a large increase upon their very limited beginnings. All the partners are self-made men, and owe their actual position to their own unaided industry and perseverance.

THE QUAKER CITY COOPERAGE, W. G. Pennypacker, Philadelphia.—The business of this establishment was commenced in 1865, on Callowhill street west of Nineteenth street, where it met with such success that in a year's time it was transferred to larger premises, at No. 1110 Noble street. From that place it was removed to Twelfth and Buttonwood streets; from there to No. 2002 Washington avenue, where it remained in successful operation for two years, when it was permanently established on its present site, at Twenty-third street and Washington avenue. The ground occupied has a frontage on the latter street of 200 feet, with a depth of 130 feet, running back to Alter street. The main building has a front of 90 feet, with the whole depth of the property. It is two stories in height, the ground floor being used chiefly for storing the staves and other material. The engine and boiler, both of sixty horse power, are placed in buildings adjoining the main structure, and supply motive power for the machinery and heat for drying the barrels before they are finished. Numerous sheds in the yard are also used for storage, and mostly filled with staves, hoops, etc. A siding from the railroad facilitates the reception of material and the forwarding of the finished barrels. On the upper floor of the building the actual manufacture is carried on, with bewildering rapidity. The staves at one end are forced into an iron hoop, then carried to a machine which forcibly confines the other ends, allowing a second hoop to be put over them. The barrel, thus far formed, is placed over hot pipes, to effectually expel all moisture. When this is effected, other hoops are put on, and it is ready for the crozing machine, an ingenious contrivance which shaves both ends in a moment, preparing them to receive the heads. This machine has been constructed upon an idea of the proprietor. Another machine shaves off the roughnesses between the staves, rendering them perfectly even and uniform, and fit for receiving the patent hoops used in the factory. The barrel is then complete, and fit for delivery. The present condition of this factory is highly prosperous, and as many as 150 hands find constant employment there, at good wages, some of the boys earning $10 per week. The number of barrels turned out daily ranges from 2000 to 2500, besides about 200 light barrels, suitable for containing liquids. To supply the

John Bower & Co

Packing, Curing & Smoking Establishment Philadelphia

large amount of material required for their manufacture, three saw mills, for the preparation of the staves, etc., have been erected in a well timbered country, in Ohio: two of them being at Van Wert and a third at Middlepoint. These mills employ from 150 to 200 hands, making the considerable total of from 300 to 350 operatives in the service of the proprietor. Last year (1872), about 13,000 cords of wood were cut up to meet the requirements of the cooperage; and, in order that the staves may be thoroughly seasoned, a stock of about 3,000,000 is kept constantly on hand at the mills, to be forwarded as occasion may require. At the commencement of his undertaking, the proprietor experienced considerable trouble and difficulty from the men belonging to the Coopers' Union; but, by the exercise of due decision and perseverance, he was able to overcome this obstacle and finally triumph, placing his factory on the substantial basis on which it now rests. For systematic arrangement, ability in management, and extent of business transacted, it is probably the most notable establishment of its kind in Pennsylvania.

JOHN BOWER & CO., Pork Packers, Philadelphia.—This firm dates from 1865, being formed by John Bower, Francis Bower and William Entenmann, who succeeded to the business already established by the senior partner. From the commencement the concern prospered greatly, and the extensive buildings in which operations are carried on,—begun previously to the partnership,—were completed and opened with great hospitality, in May, 1870. This establishment is the largest and most complete of its kind in Philadelphia. It covers an area of over 200 square feet, and is bounded by Twenty-fourth, Brown and Ringgold streets. It was erected by degrees. The main building, at Twenty-fourth and Brown streets, is a handsome edifice, three stories high, and surmounted with a mansard roof and a cupola. It is of pressed brick, and the interior arrangements are unsurpassed for convenience and cleanliness. It is built to last, the foundation walls being 21 feet deep and 3 feet thick, while the upper brick work is equally strong. The ice houses are connected with the building, and have a capacity of 10,000 tons. The ice is crushed, instead of being packed in blocks, a method found to be superior to the old plan. There are two cellars below the first floor, the lower one being used for packing meats, cooled by ice placed above them in a separate compartment. For packing, the hogsheads are placed in ice, and the meat cooled on the surface of the ice previous to being placed in them, and in this condition it will keep during the entire summer. The first floor is divided into offices, salesrooms, etc., all handsome in style. The second floor is used for draining the pickle from the meats, the floor being laid with a slope from the centre, allowing the liquor to reach the gutters at the sides, and thence by pipes to vats below. The third and fourth floors are devoted to storage purposes. Communicating doors lead to the adjoining building, at Brown and Ringgold streets. This also is provided with a cellar and sub-cellar, the latter being used for packing storage and live stock. It has capacity for storing 5000 tierces; but the requirements of the business further demand two large vaults, holding 3000 tierces, situated in West Philadelphia. The hogs are kept in the cellar on Ringgold street, which will contain 200. The slaughtering is done on the second story, where there are three pens, into which are introduced and killed six hogs at a time. The carcasses are passed through a gangway to the basement, where they are scalded, and afterwards returned to the first floor, to be scraped and dressed, when they are hung up to cool and drain, and finally cut up into joints, etc. The hams and shoulders are salted down at a temperature of forty degrees, and, when thoroughly cured, are ready for the smoke house. In the smoking operation, saw dust and hickory wood are used. The other portions of the animal are pickled and packed in the sub-cellars, at a temperature which prevents souring. The establishment has five smoke houses, each capable of containing from 1000 to 1200 hams, of which 3000 can be turned out every forty-eight hours. The process of manufacturing hams is a very rapid one, and no part of the animal is wasted. One of the peculiar features of the factory is the perfect system of drainage prevailing, whereby the usual offensive odors are entirely obviated. No space on the premises is lost; the stables even have cellars under them, and large vaults, for storing wood and sawdust, extend under the sidewalk. An engine of thirty horse power is used for many purposes. It moves the machine for chopping sausages, etc., producing about 800 pounds per hour; it saws the wood, does the hoisting, and pumps water from a well sixty-four feet deep. In addition to the animals slaughtered on the premises, the firm makes large purchases in nearly all the Western States, the senior partner spending about three months in the West every year for the purpose of buying. All this meat, however, is taken to Philadelphia and cured at the factory.

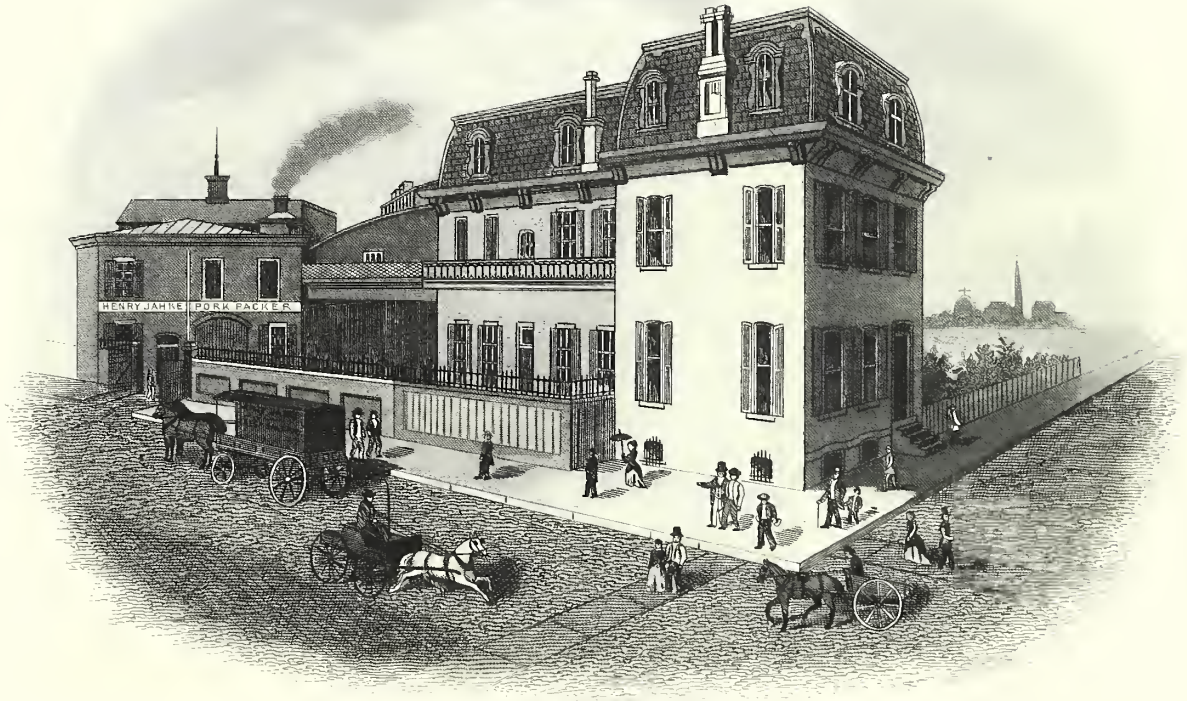
The retail business is still continued, and, for this purpose, from six to eight cattle, fifteen to twenty sheep, and at least 200 hogs are slaughtered weekly, while the lard produced has a very high reputation in the market. The establishment constantly employs twenty-five hands, including two coopers. Though the wholesale business is quite considerable, it is entirely local.

JOHN BOWER is a native of Wurtemberg, Germany, and came to this country in 1848. In 1851, he began the business of butcher in a small way, selling his meat in the market. From this he commenced the packing and curing of meats, and, in 1854, made this occupation his principal business, still retaining his stall in the market. Business increased, and he was obliged to seek larger premises. In 1858, he occupied a portion of the present site, adding buildings by degrees with the development of his business, which rapidly grew till 1865, when he organized the present firm.

H. W. BUTTERWORTH & SONS' Iron Foundry and Machine Works were established by John Butterworth — grandfather of the present proprietors—in 1820. The premises were situated on Second street, north of Brown street, Philadelphia, and the business at that time was small, being confined to the manufacture of tin work for cotton and woollen machinery. In 1844, H. W. Butterworth became the sole proprietor of the business, removing it to a larger building, 40 by 30 feet, and three stories high, on Haydock, east of Front street. In 1860, the machine business was added, the original branch, however, continuing to increase. In 1867, James B., the present senior partner, was admitted to the concern, the firm assuming its present name. In 1870, it was found necessary to obtain enlarged accommodations, and the present buildings were commenced. In 1871, Charles C. joined the firm, completing it as it now exists; soon after, the father of the two brothers retired. In 1872, a foundry was added, greatly facilitating business and the prompt execution of work. The present condition of the establishment is highly prosperous, the business having gradually increased until it extends to most of the manufacturing districts of the United States. The premises in actual use are spacious and convenient; they are situated on York street, occupying an area of 236 by 30 feet. The main building is three stories high, and 160 by 42 feet in dimension. Adjoining this is a structure 60 by 25 feet, in which is placed the machinery for tinning sheet iron. The foundry building is 72 by 60 feet, and supplied with every facility for casting in dry and green sand and loam. The lower story of the main edifice is used as a machine shop; the second is fitted up as a tinning shop; the third is appropriated to the patterns and general work, while the remaining space is chiefly occupied for storage purposes. A handsome engine of twenty-five horse power propels the machinery of the works, while a force of seventy hands is constantly employed. With these facilities, the establishment turns out annually about $150,000 worth of work. The whole works are supplied with the newest and most approved models of machinery, and much labor is saved by the use of an elevator connecting the three stories. The firm is the only one in this country engaged in the tinning of sheet iron, a circumstance which places it in a more favorable position than those which are obliged to import the article. Another specialty worthy of note is the manufacture of drying machines, for drying cotton and woollen goods and yarns. The machines manufactured here have some advantages over others, which are rapidly bringing them into favor throughout the Union, there being at the present time upwards of 400 in use in the United States. By means of patent stuffing, leakage of water is obviated; and, by an arrangement of the cylinders, made of copper or tinned iron, and supplied with patent buckets or troughs for discharging the water, more rapid and perfect drying is secured. These specialties, combined with the general ability and good management of the firm, together with the uniform excellence of the articles produced, may be regarded as the chief sources of success. This concern has been in existence for a period of over fifty years, and ranks among the oldest in Philadelphia.

HENRY JAHKE'S Pork Packing and Curing Establishment was founded in 1866. The proprietor had formerly been in business as a pork butcher; but, desirous of enlarging his trade, and being a man of enterprise, he built the large and complete establishment which bears his name, at the corner of Baring and Sloan streets, West Philadelphia. The buildings, which include a fine residence, occupy an irregular lot of ground, 125 by 60 by 80 feet, and are finely ventilated, drained, and otherwise well fitted for the business carried on. The capacity, weekly, is six cattle for Bologna sausage

John. Bowen.


HENRY JAHNE
PORK PACKER

making, and 120 hogs. The manufacture of Bologna sausages is very extensive, Jahke's sausages enjoying a good reputation. The trade is altogether local, much of the manufactured article being sold from market stalls rented by the proprietor. In pork curing, all the hams are prepared with care, and the sides, etc., sent to market. All the modern appliances for carrying on the business of such an establishment are in use · a patent ice house, knives in gangs for chopping meat, driven by a model steam engine, an improved smoke house, etc. All the fat is tried out here, and no waste is allowed, while, by the liberal use of water, with the excellent drainage, every part of the buildings is kept perfectly sweet and clean. In all respects, the business is carried on with admirable system.

Like many other of the successful men of Philadelphia, the proprietor came from Wurtemberg, where he had thoroughly mastered his business, and where he acquired those habits of industry and economy with the fact for which his countrymen are noted.

CHRISTIAN SCHMIDT, Ale and Porter Brewer, was born at Machstadt, in Wurtemberg, in 1833. His father was a farmer, but the son, after receiving the usual education, declined to follow that occupation, preferring to learn the art of brewing. For this purpose, he went to Stuttgart, where he remained three years, till he had mastered his trade, when, at the age of eighteen years, he emigrated to the United States. For want of a more suitable employment, he at first worked on a railroad in New Jersey, staying there for six months and economizing his money. At length he obtained a situation as a brewer, and subsequently became foreman to Mr. Borden, who at that time was proprietor of what was then called Courtenay's Brewery. In 1859, he obtained an interest in that concern, and finally, in 1861, became its sole proprietor, a step which led to his present position. At that time, the annual production was not more than 4000 barrels. The building fronts on Edward street, and runs back about 125 feet towards Girard avenue, Philadelphia. It is supplied with an engine of twelve horse power, which furnishes the motive power and the steam for boiling the liquor. The establishment employs twenty men. In 1871, he built a commodious malt house on Edward street, four stories in height, with a capacity for malting 50,000 bushels of grain during the season. He has made several improvements in different branches of the business since he took possession of it; among others may be mentioned a spacious and convenient cellar, 18 feet below the street, and capable of containing 4000 barrels. This is constructed under the malt house, and is connected with the brewery by pipes. Since 1861, the business has been constantly increasing, until, at the present time, the annual amount brewed reaches 20,000 barrels. He makes a specialty of brewing porter, for which he has a large reputation, the demand for the article being great and increasing. By his own energy, enterprise and business ability, he has raised his brewery from insignificance to an importance which entitles it to rank among the large establishments of the city and State.

A. M. COLLINS, SON & CO., Card and Card Board Manufacturers.—This business originated in 1857, when A. M. Collins commenced the making of cards, of "Bristol board," in two small rooms at the corner of Callowhill and Twenty-fifth streets. There, through untiring energy and attention, he brought the business to great prominence, laying the foundation of his future success. The demand was so great that his premises became insufficient to supply it, and larger and more powerful machinery was required. He accordingly erected, at the corner of Canal and Third streets, a building four stories in height, and 75 by 30 feet; also occupying, in an adjoining house, two rooms, each 40 by 80 feet. Here he removed in 1863. The factory is supplied with extensive and costly machinery. A steam engine of thirty horse power furnishes the motive force. Two-fifths of its capacity are required to drive the twelve cutting machines, the rest being employed in various ways. There are three machines for plating, two for enamelling, two for glazing, four for calendering, and one large one for enamelling with the "China clay," a substance imported from England. Besides these are numerous enamelling machines, worked by hand. The total cost of the apparatus, irrespective of the building, was over $50,000. The latter is heated throughout by steam, as are also the drying rooms. The following figures will give some idea of the magnitude of the business. Five hundred barrels (100,000 pounds) of flour are annually used, and from four to five tons of paper are worked up daily. The yearly issue of sheets of pasteboard aggregates

5,000,000, and at least 150,000,000 of small cards are cut up, one-half of this immense number being used by the railroads. The number of operatives employed solely in the preparation and finishing of the cards, is 160 persons, besides a large staff of printers, lithographers and designers of photographic cards, constantly at work. This latter important branch of the business received a great impetus during the war, the average monthly sales of *cartes de visite* being 1,250,000. Every soldier would leave his portrait with his family and friends, receiving similar tokens in return, while a large business was also done in camp by perambulating photographers. In 1868, H. H. Collins, son of the senior member of the firm, and M. E. Cope were admitted as partners, when the present style of the firm was adopted. In 1870, the office and warerooms were removed to No. 18 South Sixth street. The house fulfils orders throughout the United States, from Maine to California, also supplying Canada, the West Indies, South America and Japan. The United States Government is also a large customer for cards for mounting views, obtained by exploring and surveying expeditions, on home and foreign stations. As being characteristic of the energy and resources of the firm, it is related that certain parties, having applied to several first-class New York houses for a peculiar design of card, without success, were recommended to try A. M. Collins, Son & Co., of Philadelphia, they being the only firm in the country competent to execute the order satisfactorily. They followed the advice, and the required article was promptly supplied.

NAX & KÜHN'S SMOKING PIPE MANUFACTORY was established by the present proprietors, in 1864, in Edward street, Philadelphia. Commencing business with a limited capital and with nine assistants, they soon demanded larger space and removed to 112 South Eighth street. Here prosperity followed the firm, and they were able to employ from fifty to sixty hands. At the expiration of four years they purchased and occupied their present building, where they employ at this time over one hundred men and boys. The principal business is the manufacture of all kinds of smoking pipes of briar and hard wood. The briar wood comes extensively from Virginia, while the rosewood, boxwood, and black ebony is brought from the West Indies. Arrived here it is sawn by machinery specially adapted to the purpose, and passed through every process until fully fitted for market. The horn for stems is purchased from the comb-makers. The metallic attachments and ornaments are all made by themselves. Producing every variety of pipes and all goods pertaining to the trade, they have patented not less than four improvements. In addition they make an instrument largely in use by physicians known as the Barmscheidt instrument, and shaving-brush materials, in which they have a large trade. Their trade is both local and general, a large business being done in the city and vicinity, while their goods are shipped to every part of the country.

The machinery is propelled by a fifty horse power engine; and two buildings, three and four stories high respectively, are entirely occupied in the manufacture. The machinery is arranged with great system, and the operatives sit in rows at the benches, while the multitude of wheels and belts give a busy appearance to each room. On the first floor front the roots and blocks are sawn into rough shape. The second story is devoted to filing and turning; the third to carving pipes and turning horn stems, while the fourth is for the polishing, sand-papering, and general finish. In the back buildings, the first floor is given to packing and fitting the various parts; the second floor is occupied by the boring machines, and the third is a metal-working room. A stable in the rear is occupied by three horses, a large cellar on Third street and an extensive yard are used for storing, while several buildings adjacent are now rented, but held in reserve for the extension of the factory.

Both the partners are practical workmen, and competent to direct every detail of the manufacture. Mr. Nax specially attends to the manufacturing department, while Mr. Kühn is business manager. Personal attention, promptness, and business qualifications are the secrets of the success of the firm.

GODFREY KEEBLER, Manufacturer of Fine Cakes, Crackers, etc., commenced his present business in the year 1862, when he succeeded to that formerly carried on by John T. Ricketts, for whom he had worked as foreman. On the death of the latter, he purchased the property, with some adjacent lots, and immediately entered with zeal and energy upon his new enterprise. The business had previously been small and unprofitable, and he began it in a very limited way, starting with but three ordinary tile ovens, to which he subsequently added a fourth. His capital was small and derived from

G. KEEBLER'S STEAM CRACKER BAKERY.
RACES
VINES

Godfrey Keebler

his previous earnings; but, under his management, the trade sprang up rapidly, requiring, from time to time, the addition of new machinery and the employment of more workmen. This continued, from year to year, till, at the present time, this bakery furnishes the largest variety of goods of any similar concern in Philadelphia, which contains several of these establishments, though the manufacture of assorted cakes and crackers, on an extensive scale by machinery, is of comparatively recent date. The factory, situated at Nos 258–264 North Twenty-second street, is large in its dimensions, being 70 by 80 feet. It is three stories high, surmounted by a mansard roof, and completely furnished with all necessary appliances and apparatus. An engine of twenty horse power, supplied by a boiler of thirty horse power, drives the many novel and ingenious machines now in use. The furnaces are so constructed as to economize fuel, by consuming the gases they produce. The mixing, kneading, and rolling of the dough are performed by distinct machines, in the most perfect manner. When ready, the dough, if designed for crackers, is subjected to another machine, for forming it into pellets, afterwards to be pressed by the stamp, and, when thoroughly baked, they are placed for a day in a kiln, to dry them. The dough for cakes is treated differently. It is placed on a machine, provided with three aprons, which successively rolls, cuts, and stamps it, besides placing it in pans, ready for the oven; while the chips are deposited, by a lower apron, in a box to be worked over again. The soft dough is pressed, by screws, into moulds, while a knife with a lateral motion divides it into the proper thickness. The moulds are in endless shape, size, and variety. A large amount of broken crackers, and crackers made for the purpose, is ground to be used for culinary purposes. The most curious machine is, perhaps, the revolving oven used here. Two of them are employed, one being twenty feet high by ten feet in diameter. It consists of a chamber, filled with hot air, in which revolves a wheel, having ten shelves attached to it. On these are placed ten pans, of ten feet in length, making 300 square feet of baking surface in all. By this means the cakes are subjected to a uniform heat. Two ordinary ovens have been added to the original number, thus making six in constant use. The machinery is of the most modern patterns, from the factory of Ruger & Co., Buffalo, New York, and additions are frequently being made to it. The cellars are capacious and well-stocked with the material necessary to the manufacture, while the upper floors are adapted to packing purposes, and new machinery is being placed in them. The whole factory is characterized by system and neatness, and the offices, wholesale and retail sale rooms, are managed with regularity and order, highly creditable to the proprietor. The business has so increased that at present there are employed forty-five men, in the baking department alone, and a very considerable number of others, for distributing the goods through the city and adjacent country. The success of this factory is doubtless to be ascribed to the character of the proprietor, who unites to industry and general business ability a clear insight into the utility of novel machinery and a determination to keep pace with the times. Clear-headed and sagacious, he is, at the same time, always fair and just in his dealings.

He was born in Wurtemberg, February 17th, 1822. His father, who was a farmer, emigrated to this country in 1832, and settled in Philadelphia, afterwards removing to near Phœnixville, Pennsylvania. Two years later, his son engaged in farming for others, spending his winters at school till the age of nineteen years, when he went to Philadelphia to learn the trade of bread baking. At the age of twenty-two, having previously learned cake baking, he established himself in that business, on Market street, west of Thirteenth street, where he remained two years, and then went to Columbia, Pennsylvania. There he was in business four years, and lost his wife, after which event, he returned to Philadelphia, engaging with John T. Ricketts, as foreman. In 1862, his employer, desirous of serving him, suggested his going into business for himself, and assisted him, with some machinery, to establish himself in his present locality. He also promised him pecuniary aid; but death prevented his doing so. Although deprived of this aid, he purchased the property and commenced his present business. He was formerly an old line Whig; but has latterly joined the Republicans, though taking no active part in politics. He has, recently, been a member and Treasurer of the Board of Directors of the German Hospital; is a member of the German Society for the Relief of Emigrants; a member of the Board of Directors of the Schuylkill Verein; one of the originators of the German Fire Insurance Company; a member of the Macy Commandery and Robert A. Lamberton Lodge, No. 487, of Masons, of which he was the first master. Of good mental and bodily powers, he is regarded by his friends as a frank, fearless advocate of right, a true friend and a benevolent, warm-hearted gentleman. As a business man, he is distinguished by his enterprize and unswerving integrity; as a citizen, by his large public spirit.

THE PHILADELPHIA & KENSINGTON FIRE BRICK AND CLAY RETORT WORKS were founded in 1856, by John Neukumet, at one of the present locations. The capital employed at first was comparatively small, the manufacture being then confined to fire bricks, tiles and blocks. Clay retorts were not at that time used here, and English bricks were exclusively employed by Philadelphia manufacturers; but the proprietor, in two years, by energy, perseverance and supplying a reliable article, threw the foreign bricks out of the market and succeeded in substituting his own for them. Since then, the manufacture has increased yearly, the demand frequently exceeding the supply. The factory at Twenty-third and Vine streets was, at first, the only one established; but, in 1865, the Kensington works, at Beach and Poplar streets, were added, and, the following year, the retort factory at St. David and Vine streets was also added to the parent establishment. In 1867, Philip Neukumet, the present proprietor and brother of the founder, was admitted as a partner. He had long been identified with the concern and, having a practical knowledge of the business, had been for the previous two years the general manager of the works and became, three years later, on the death of his brother, sole proprietor of them. The ground occupied by the factory, at Twenty-third and Vine streets, has an area of seven acres. The main building is 146 by 369 feet, and the remaining space is occupied by the yards and sheds required for storage. The retort shop is 72 by 165 feet, while the carpenter's shop, sheds and auxiliary buildings cover the rest of the ground. The Kensington factory occupies between two and three acres, on Cohocksink creek. A spacious and convenient wharf (72 by 400 feet), extending along the Schuylkill river, has also been provided, and lately additional wharfage front, on Twenty-third and St. David's streets, has been secured. All the material used in the manufacture is obtained from mines owned by the proprietor and situated at Perth Amboy, and Woodbridge, New Jersey, in direct communication by water with the works. The operation of making the bricks is as follows: The clay is placed in pits, 30 feet square, and properly mixed according to the quality to be made. It is then left all night to ferment, having been previously saturated with a certain proportion of water and mixed with clay calcined and ground; next it passes through the tempering and brick machines, coming out of them in bricks of a rough shape. These bricks are then laid on the drying floor, heated by furnaces, to make them ready for pressing. After the latter process has reduced them to their proper and permanent shape, they are again dried and finally burned in the kilns. Bricks or blocks and tiles, of special form and size, are moulded by hand, from drawings or patterns, adapted to each description. Five kilns are used at Vine street, three at Kensington, and two at the mines, while an area of 6250 square feet is required for drying. The present capacity of the works is 22,000 quick bricks, eight or nine retorts, beside an immense quantity of special work daily. To perform this work four engines, of 115 united horse power, are required, while the hands employed consist of 200 fire-brick workers, three blacksmiths and machinists, five carpenters, two masons, one wheelwright, two draughtsmen and sixteen teamsters, and, although sixteen horses are permanently in use, four to five extra carts are hired daily. The whole of this vast establishment is under the direct management of the proprietor, with the assistance of an office staff of six employés. The prosperity of these works has, for several years past, been remarkable, the demand for their products frequently exceeding the capacity of the factories. In 1872, ground was obtained sufficient for the erection of suitable buildings in order to double their powers of production. The only disaster experienced, since the commencement of the establishment, was a fire, which occurred in 1873, totally destroying the whole of the original factory; but a new factory has risen from the ashes, and no contract previously made has been abandoned. The rapid growth of this concern is perhaps due in part to its having been the first of its kind in the State, but chiefly to the energy, judgment and skill displayed by the founder and his successor.

PHILIP NEUKUMET was born in Eich, Hessen-Darmstadt, January 31st, 1846. His father was a government surveyor and architect, for the greater part of his life. In 1859 he came to America, where he pursued the latter occupation till his death, which happened in Philadelphia in 1866. His son, originally destined to the same pursuit, received a partial education in Germany, completing it at a private school in Philadelphia, where he paid special attention to the higher mathematics, mechanical drawing, chemistry, and kindred branches. He preferred to enter the employment of his brother, with whom he perfected himself in the details of his present business, in which it was understood that he should ultimately become a partner. At the outbreak of the late war in 1861, he enlisted in the 73rd Pennsylvania Regiment as a private, passing, during the first ten months,

PHILADELPHIA

Philip Neukumet

through different grades till he became Orderly Sergeant. Immediately after the second battle of Bull Run, he was appointed by the Governor Second Lieutenant of the 2nd Pennsylvania Artillery, for bravery in saving the regimental flag, at the battle of Cross Keys. He was with the army of the Potomac, from Port Royal to Petersburg, taking part in all its engagements. While making a reconnoissance in front of the latter city, he was severely wounded, by falling from a tree, and disabled from further service. On recovering his health, he re-entered his brother's employ and, in 1867, became a partner in the business of which he has had sole charge since his brother's death in 1869, showing his capacity by trebling it since then. He is a life member of the German Hospital, of the German Society for the relief and employment of German emigrants, and of the Young Mænnerchor. In 1868 he was married to Anita, daughter of Daniel Kellner, by whom he has had three children. While his promptness and reliability, in business matters, have enabled him to successfully conduct the largest concern of its kind in the United States, his private qualities have endeared him to his family and a large circle of warm friends.

BLACK DIAMOND WORKS FILE MANUFACTORY of G. & H. Barnett.—This establishment was commenced by the two brothers, in 1862, at No. 1010 North Front street, under its present style. They began in a very small way, employing at first only four hands, and confining their business, almost entirely, to Philadelphia. Both, however, being practical men and thoroughly conversant with their trade in all its branches, they soon found that the quality of their goods was gaining for them a rapid demand, which steadily increased, till 1865, when requiring more room, they built a shop 60 by 20 feet, on Richmond street, near Frankford road. Two years after, they were compelled to make an addition to it of 40 by 20 feet, all their work being performed by hand and the grinding part of it given out. In February, 1870, still more room being needed, they made another addition (100 by 20 feet) to their works, the whole constituting the present factory, whose dimensions now are 60 feet front by 100 feet deep. For their heavier forging they now employ a steam hammer, and claim to be the first and only ones to use it for that purpose. By the use of this machine, one man can do more work in one day than two could accomplish in two days by the old system of forging. At the present time they employ fifty hands, and the annual amount of their sales is about $60,000. At the works are manufactured files and rasps of every description, and it is interesting to inspect the different varieties produced. They range from the finest and most delicate tool required by the jeweller or dentist, to those of the heaviest kind in use for mechanical purposes. Although the business is not so extensive as some in the country, it is gratifying to mention that, from the humblest beginnings, it has steadily increased to its present proportions, with every prospect of advancing more rapidly in the future.

GEORGE and HENRY BARNETT are the sons of William Barnett, of Nottinghamshire, England. They came to this country in 1847. They were apprenticed to J. B. Smith, file manufacturer, for ten years and fifty-six days: but remained with him for fourteen years, and accumulated some money. After that time they moved to Pittsburgh, where they commenced business for themselves, under the name of Barnett & Brother, for the manufacture of saws and files. They were afterwards joined by another brother. Their business there was on a small scale, and lasted but a short time. In 1862, they left Pittsburgh and returned to Philadelphia, where they began their present enterprise. Both are thoroughly competent workmen, and attribute their success to nothing but the superiority of the tools they make, claiming that they are equal to any in the market.

WILSON, FENIMORE & FITZELL, Manufacturers of Paper Hangings.—The foundation of this enterprising house was laid by the senior partner, who commenced the manufacture of plain wall paper, alone, at the corner of Fourth and Branch streets, in Philadelphia. Business increasing, he moved to a factory at the corner of Twenty-second and Wood streets, and opened an office and ware-room at 621 Market street, selling his products in that city only. He continued thus till 1868, when E. L. Fenimore joined him. The increase of capital thus obtained, enabled the new firm to extend its operations, and the locality of the sales-room and office was changed to 14 and 16 South Seventh street. In 1870, their factory was burned, when they immediately erected the present structure, especially suited to their purposes. It is situated at Eighteenth street and Washington avenue, on the line of the Philadelphia, Wilmington & Baltimore Railroad.

The main building is 50 by 150 feet, three stories high, with engine and boiler room attached; also a two story office building—all of brick. The manufactory is supplied with the latest improved machinery, including apparatus for printing paper from copper rollers, in the same manner that calico is printed. They have a machine, probably the only one of the kind in the United States, for this purpose, which enables them to produce excellent work. In 1871, F. Fenimore became a partner in the firm. Since the entrance into the business of E. L. Fenimore, the sales, previously confined to Philadelphia, have been extended to other parts of the country, as far west as Cincinnati, and since that period the business has almost doubled annually, the demand frequently exceeding the supply. They manufacture all kinds of paper hangings, and in their specialty, "plain tints," they make some seventy-five different shades, continually replacing the old styles by new ones, which they are the first to bring out. The wood engraving and block printing is done on the premises, and, by the employment of a tasteful designer, they are enabled to produce new and original designs. They also manufacture a large portion of the colors they use, and are constantly introducing labor-saving machinery. They produce a great deal of hand-made paper, which is superior to that made by machinery, the patterns usually being columns, centre pieces, decorations, etc. Besides these, they manufacture common paper, and what is known as blanks and satins, likewise hangings, imitating different kinds of woods, and have a reputation of producing such goods equal to the French article. The business of the firm has constantly increased from 50 to 75 per cent. per annum, and their transactions now extend to all parts of the Union, from Boston to Minneapolis and New Orleans. Having recently decided to establish a store for the convenience of retail trade, they removed their warerooms to the fine and spacious building, 622 Chestnut street, running back 225 feet to Sansom street, with a front of 28 feet on each street. This store is directly connected with the factory by telegraph wires, which communicate with the Western Union line, affording the utmost facility for the transmission of orders to the works. To superintend this branch, they admitted as a partner R. W. Fitzell, who is well known in that branch of trade, and very competent to conduct it prosperously. The paper used in the factory is derived from mills at Troy, New York, Brooklyn, and in Pennsylvania, the utmost care being taken to select none but the best. One of the special causes to which they ascribe the present and past development of the business is the thorough system which has been established throughout, each member of the firm taking charge of a special department. The senior partner directs the manufacture, E. L. Fenimore has charge of the sales, with oversight of a large corps of travelling salesmen, agents, etc., F. Fenimore superintends the finances, books, accounts, etc., and lastly, R. W. Fitzell manages the retail store. The special feature, in which they excel their competitors, is the making of "plain tints," in which their variety of colors or shades cannot be surpassed. The financial status of the house has always been excellent, and they were not at all shaken by their loss in the fire of 1870, though it amounted to $12,000, but immediately built their present factory, which, for its appointments and facilities, is equal to any in the country, as is also their handsome retail store.

THE WHARTON RAILROAD SWITCH COMPANY, Philadelphia.—These works were established in 1868, but removed to their present location in 1873. The premises occupy ground on the north side of Washington avenue, between Twenty-third and Twenty-fourth streets. The frontage on the former is 415 feet, and they extend back for 372 feet, to Carpenter street. The main building is 100 feet square, and to this is attached a separate structure, for the blacksmith's shop, the boiler room, and an engine of forty horse power. The products embrace railroad switches, "frogs" and other track supplies; but chiefly the "Wharton Railroad Safety Switch." The company employs constantly from sixty to eighty men. The frogs made are of various kinds, and have obtained so great a reputation for their excellence that they are now in use, in connection with the other track material manufactured by the firm, throughout the United States, from Maine to California, and even in the South American States. Their superior quality has thus been severely tested by exposure to every degree of heat and cold. The advantages of the patent switch are thoroughly appreciated by railroad men, and it is now in use on many of the principal lines of road in the country: among others are the Pennsylvania Railroad, the Philadelphia, Wilmington & Baltimore Railroad, the Chesapeake & Ohio, the New Haven & Northampton, the Southern Railroad Association, the Northern Central, Baltimore & Potomac Railroad, and others. Great care is taken in its manufacture, so that all the parts shall have the requisite strength,

Wilson & Fenimores

Manufacturers of Paper Hangings, Philadelphia.

be accurately made and adjusted, in order to insure proper working when laid down. Few inventions for guarding against accidents are more important than this, and its practical utility has been fairly tested by its extensive and rapidly increasing use on various roads. By its use, the main track always remains unbroken and continuous, leaving the main travel unimpeded. The shocks and jars, so injurious to the rolling stock and uncomfortable to passengers, are obviated, the switch being only used by such cars as are intended to enter the sidings, which fact also prevents its wear and tear. Being made of Bessemer steel, it is very durable, and consequently very economical, both in itself as well as in its action upon the locomotives and cars. It is so arranged that, if left wrong by neglect, a train travelling along the main track clears its way through without obstruction, the first wheels opening a passage for the rest without any perceptible jolt. Many trains have undoubtedly been saved by its employment. In some cases, as on single tracks, etc., the presence of a switchman is necessary; but, should he fail in his duty, the machine rights itself, removing from the main track, which is left free. The rails of the main track being solidly spiked to the ties, the danger from the breaking of switch rods is avoided, and the main travel is practically safe; while, under the old system, a portion of the main track is held in place solely by means of the switch rod at one end, which is liable to break, leaving a part of the main line loose. So many accidents have occurred on railroads that any invention which removes or even diminishes danger to life and property, is deserving of success and encouragement.

SELLERS BROTHERS.—This is one of the oldest houses in the city of Philadelphia, the founder of the same, John Sellers, being the first man in North America to manufacture wire cloth. He commenced over a century ago, some fifteen or twenty years prior to the Revolutionary war. When these years of conflict drew nigh, and it was determined to issue the "Continental currency," a difficulty was encountered in procuring the proper mould on which the paper could be made. Nathan Sellers, one of the sons of John Sellers, offered to manufacture the article, which was done in a secluded spot in the country, and under military surveillance. Having succeeded in his undertaking to the satisfaction of the authorities, this new feature was added to the business of the concern. About 1781, Nathan associated with his brother David, under the firm of N. & D. Sellers, and continued the business. During the whole period that hand moulds were used for making paper, this house was the only establishment in the country that fabricated them. S., C. & I. Sellers were the successors of the former, and continued in the same line of business. Then came another change: C. Sellers retired and started the same description of manufactures on his own account, while S. & I. Sellers continued as before. After a time, the latter associated themselves with Abraham L. Pennock, under the style of Sellers & Pennock. These gentlemen were all active and zealous members of the old Volunteer Fire Department—attached to the Philadelphia Hose Company—at that time a position considered highly honorable. J. Sellers, one of the firm, invented the process of riveting leather hose, for which he obtained a patent; this constituted another feature of their business, and naturally led to the manufacture of leather belting. After a lapse of years, James Sellers, with his son, David, succeeded under the firm name of J. & D. Sellers. After a while, Samuel, a still younger son of the senior partner, was added, and the style became J. & D. Sellers & Co. As time wore on, another change occurred, by the admission of George, a son of Abraham L. Pennock, above mentioned, and once more the house was Sellers & Pennock. This co-partnership continued until James and David Sellers and George Pennock severally retired. Samuel Sellers, the remaining partner, then associated his brother Charles with him, constituting the firm of Sellers Brothers. This partnership dates from January 1st, 1857. Since that time, they have admitted another brother, Edward, and also J. Ridgway Bunting into the concern, though the style of the house remains unchanged.

In 1857, their factory and store was located in Sixth street above Market; but the premises proving inadequate for their business, they erected a building on Commerce street, retaining the Sixth street edifice for storage purposes, with salesroom attached. In 1863, they purchased their West Philadelphia property, whereon they built a large factory, which, in the space of nine years, has been extended three different times, and now (1873) is about to receive a fourth addition. The factory has a frontage of 225 feet on State street, 140 feet on Powelton avenue, and about 80 feet on Sloan street. In the manufacture of wire goods and ornamental railings, they employ about 125 hands, with a weekly pay roll of $1000. The machinery is of the most approved description, and very expensive. Of the twenty-five looms, there are five which

cost in the aggregate some $10,000. Most of the work is done by hand, though they have a twenty-five horse power engine in the establishment. Wire cloth is here woven of all descriptions, from two inch mesh to one hundred meshes to each inch, the wire being either iron, brass, or copper. Their Foudrinier wires have a wide-spread reputation, and are sold all over the Union. This department of the factory is now constantly at work, day and night, and the orders are sometimes three months in advance. Bridge-railing—for which there is an extensive demand—is a specialty with this house. They have now a contract for over 5000 feet for the great bridge over the Mississippi river at St. Louis, which will cost $30,000. They have also contracts with other Western companies. In 1867, their Sixth street premises proving entirely inadequate for the immense business transacted, they removed to their present location, No. 623 Market street, and here they are connected with their factory by telegraphic wire.

THE WEIKEL & SMITH SPICE COMPANY, Philadelphia, was incorporated in January, 1868, but its true origin dates back to 1850, or 1851, when the firm of Hummell, Bohler & Co. had an establishment on Callowhill street, for the manufacture of what is known as essence of coffee. This firm underwent a variety of changes, both in its style and its members, till it became George W. Weikel & Smith, and was finally transformed into a corporate company. The extensive premises owned by this company, situated at Nos. 133, 135 and 137 North Front street, are worthy of notice for the admirable arrangements and plan of the whole. The buildings are five stories high on Front street, and six stories on Water street, with one story higher in the centre. On this is placed a tank having a capacity for holding 1200 gallons of water, which can be distributed through the whole establishment by means of hose, as a safeguard against fire, with which the buildings have been already twice visited. A most perfect system reigns through all, from the basement to the roof, every department being kept separate, to insure cleanliness in handling the materials and to prevent deterioration, from their too close proximity. Coffee in its various forms is an important article of manufacture. It is roasted by Burns' patent roasters, a number of them being employed, each one capable of containing 150 to 200 pounds, and of roasting forty-eight bags daily. The coffee is cooled by means of suction, the hot air drawn off being passed into the fire flue. Much of the coffee is put up in air tight packages, and is sold in either the whole or ground state. The building is also supplied with shoots, for conveying the different kinds of ground spices to the packing room. The company is constantly adding to the list of articles prepared in the factory. These are varied and numerous. Among them are, "Celery salt," for flavoring, Essence of Jamaica ginger and sugar, a kind of blacking called "Lemberger's American Oil Polish," pepper, ginger, cloves, cinnamon, allspice, nutmegs, mace, mustard, rice flour, cream of tartar, baking powder, etc., all put up in convenient packages, and forming, perhaps, the largest and most varied list in the line prepared by any house in the State. The present condition of the company is very satisfactory and the business constantly increasing. The works now employ from forty to fifty operatives, and are provided with a steam engine of twenty horse power, for driving the mills and other machinery used in the different preparations. The present amount of capital invested in the concern is $83,000, to be increased to $100,000; and the annual amount of productions is set down at about $400,000.

The partners forming this company are all thorough men of business. The manufacture and other details are divided into separate departments, each superintended by a special manager, experienced in the branch assigned to him. This division of labor has doubtless been highly conducive to the interests of the concern, by insuring the best attention and skill in the manufacture of every commodity dealt in. It may, perhaps, be regarded as one of the chief causes of the success of the establishment.

MCILVAINE & CO.'S IRON WORKS, Philadelphia, were founded in 1847, by Dougherty & McCall, and were carried on with a small capital until 1853. Then they came into possession of F. McIlvaine, who had been enengaged from 1841 in the manufacture of heaters and ranges, in which branch of industry he was a pioneer. The original firm had done a small business in the way of castings only, but on the accession of the new proprietor, the present specialties were introduced. Practical in his knowledge of the manufacture of iron work, and prudent in business matters, he commenced the new enterprise in a small way at first, relying upon the quality of his wares to bring them into favorable notice, and increasing the supply in proportion to the growing

Office and Manufactory of the
Weikel & Smith Spice Co. Philada

demand. Closely attending to the details of his business, he has had the satisfaction of seeing the establishment grow to proportions entitling it to rank among the first in the State; and, while the trade is local, nearly every dealer in the city looks to these works for his supplies. The building is 90 by 140 feet, and admirably fitted for the purpose for which it was designed, direct connection being had with the various railway lines traversing Washington avenue, permitting the ready removal of heavy material to and from the works. The engine used is of sixteen horse power; from thirty-five to forty men are employed, and the iron, of which from four to five tons are melted daily into the various forms of their workmanship, is derived wholly from Pennsylvania. In taking possession of the works, the present owner commenced the special manufacture of bath boilers, kitchen range and heater castings. Ranges constitute the principal part of the work turned out, a specialty being made of flat top ranges, for hotel and family use, all varieties having been patented by this firm, and all modern appliances for comfort, economy and utility being embraced in their catalogue. Bath boilers, pipes and sinks are also furnished in large quantities to plumbers and contractors, as well as to the trade; and all general work is made on demand, as in other establishments of a similar character. Since 1865, operations have been under the efficient supervision of William P. Steward, who was the book-keeper from 1856 to 1865, when he was admitted into partnership. The work under his direction is carried on with system, while the entire business is managed by the firm in accordance with the best commercial principles, a constant effort being maintained to keep their wares up to a high standard of excellence.

WILLIAM K. MOSSER, Tanner, was born in Lynn township, Lehigh county, Pennsylvania, April 4th, 1822. His education consisted of about a year's schooling, after which he devoted himself to his father's calling, that of tanning, occupying his leisure hours in study, so that he is well informed on all prominent subjects. His father established himself in business many years since, his capital on commencing consisting of his thorough knowledge of the business, his industrious habits, and his determination to succeed. He originally resided in Lynn township, Lehigh county, Pennsylvania, but, in 1829, he removed to Drexlertown, and finally to Allentown, in 1849. As soon as William was old enough to assist his father, he entered the tannery, where he applied himself and thoroughly mastered the art. In 1854, the father retired altogether with a competency, when William K., and his brother, James K. Mosser, became proprietors. The former contributed a cash capital of $75, and with a credit of about $6000 from their father, the brothers took hold of the enterprise, and by dint of hard labor were successful beyond their expectations. In 1855, their brother-in-law, Peter K. Greiner, invested $1000 in the business. Four years later, James K. Mosser retired. William K. was now worth about $8000. He redoubled his exertions, and gradually but surely increased his manufactures, so that it produces at the present date about $100,000 per annum. In 1870, he purchased the entire property, of which he is now the sole owner. In 1859, he was elected a director of the Allentown Bank, and remained in the board for three years. For many years he was an active member of the Whig, and subsequently of the Republican party; he was an earnest supporter of the Government during the Rebellion. He has been a member of the German Lutheran Church for many years. He was married, in 1850, to Lucy N. Fisher, of Drexlertown, Lehigh county, Pennsylvania.

JUNIATA WIRE AND RIVET MILLS were founded by R. Townsend & Co., in the year 1828, and are one of the oldest establishments of the kind in the country. At the commencement, wire was the only article manufactured. The factory was then a small building, 30 by 50 feet, and did not employ more than seven or eight hands, making about 100 tons a year; but the business has steadily grown to the present day. In 1842, William P. Townsend, now the senior member of the firm, was taken into partnership, and the same line of manufacture continued till 1852, when the manufacture of rivets was added, and has since become a specialty of these works. They are made in every variety, ranging in size from one-sixteenth to a half inch in diameter, and of any length not exceeding four inches. The variety consists in the shape of the heads, which are either flat, oval, round, or countersunk, as may be required. The iron used is the best "charcoal," mainly that from Norway. The whole process of making the rivets is gone through at the factory. The iron is taken there in the rough state, melted, and drawn by machinery into the desired gauges of thickness. The firm has always kept pace with the times, in

adopting improvements in the making of this article, and the results of this policy are visible in the vast development of the business, the increase of sales and the larger number of hands employed. The present factory is a handsome structure, two stories in height, covers an area of 300 by 50 feet, and gives employment to fifty workmen, turning out about 800 tons annually. The salesrooms are situated at Nos. 19 and 21 Market street, Pittsburgh, where an extensive assortment of goods is constantly kept on hand, and the factory is at Fallston, Beacon county, Pennsylvania. The transactions of the firm are very extensive, and it is said that a better or more lucrative business of its kind is not carried on in any part of the country.

R. TOWNSEND, the founder of the concern, was born in Pittsburgh, in 1795. His school education was very limited, and at an early age he began to learn the wire making business. In 1816, he commenced business for himself, on or about the spot where the salesrooms now stand. Here he continued, with much success, till 1866, when he withdrew from active labor. No one stood higher in the community than himself, and his business activity and energy, combined with his social qualities, won him the esteem of all who knew him.

WILLIAM P. TOWNSEND, the present senior member of the firm, was born in Pittsburgh, in 1817. He was educated in his native city. At the age of sixteen, he entered the wire manufacturing business, and was influential in coupling with it the making of rivets.

THE CHESTER DOCK MILL, Lewis & Parker, Proprietors.—This establishment originated with Phineas Lounes and Abraham Blakeley, who engaged in the manufacture of cotton goods at Knowlton, Delaware county, Pennsylvania, January 1st, 1847. In the autumn of 1853, Abraham Blakeley disposed of his entire interest to J. William Lewis, and operations were continued by Lounes & Lewis until the death of the former, in 1856, after which it was continued by J. William Lewis, the deceased partner's interest being retained by his estate. The original mill having been destroyed by fire, one half of the present structure was erected in 1864, and, in 1867, M. E. Parker became a partner, the firm assuming the present style. Having been enlarged in 1869, the main three story building now covers an area of 207 by 54 feet. There is also a chain of outbuildings, 120 by 60 feet, beside all the additional structures necessary for the successful prosecution of their business. They run 226 looms, 6232 spindles, and all the requisite machinery for dyeing, preparing and finishing goods. Power is obtained from a 200 horse Corliss engine, to which steam is supplied by six Dimpfel boilers. By the employment of 150 hands, they are able to turn out about 9000 pounds of yarn per week, and about 55,000 yards of checks, plaids, stripes and tickings. Their goods are sold principally in New York.

J. WILLIAM LEWIS, the son of John Lewis, a leading paper manufacturer of Delaware county, was born in Springfield, Pennsylvania, August 16th, 1830. He was educated at the Friends' Select School, in Philadelphia, and, having learned the manufacturing business, he entered into partnership with Phineas Lounes.

M. E. PARKER was born in Reading, Middlesex county, Massachusetts, October 27th, 1828, and is the son of J. D. Parker, of that place. He received his education on the New England plan, commencing in a day school and completing his studies at the Academy at Newburg, Vermont, in his nineteenth year. He spent five years in the Merrimac Manufacturing Works, at Lowell, Massachusetts, subsequently engaged in various enterprises, and finally embarked in the present business.

THE AMERICAN DREDGING COMPANY.—The origin of this company dates back to 1848, when Aaron B. Cooley commenced dredging operations with one dredger, worked by horse power, and of small capacity. He was afterwards joined by Captain John Somers, and, with some changes in the firm and the number of machines employed, the business was continued till 1867, when, by a special act of the Legislature, the formation of a corporation was authorized and the present company organized, with a capital of $200,000. The officers were: Captain John Somers, President, and F. B. Colton, Secretary and Treasurer. The other incorporators were, William Somers, John Heins and E. B. Colton. The company purchased the property and franchise of the Delaware River Dredging Company, increased their dredgers to six, with three tug boats, and commenced operations. The various demands upon the company, in dredging, driving piles, building dredgers and tug boats,

GUSTINE'S FURNITURE WARE ROOMS
P.P. GUSTINE'S FURNITURE WARE ROOMS
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FURNITURE
MATTRASSES
P.P.GUSTINE

Gutekunst Photo Co. Philadelphia

P. F. Gustine

and other matters appertaining to their business, became so great that an additional issue of stock was authorized, to the extent of $1,000,000, nearly half of which is already subscribed and paid for. Its operations have been carried on in most of the sea-coast States, and even in South America. The company has constructed all the dredgers now belonging to the United States Government, to the satisfaction of the latter. Among the operations undertaken, may be cited the improvement of Windmill Island, opposite Philadelphia, the filling in and improvement of the properties of the Pennsylvania Railroad Company along the Delaware, the construction of a canal connecting the Salem and Delaware rivers, the completion of the Dutch Gap Canal, in the James river, Virginia, undertaken by General Butler as a war measure, and the wharfing, filling in and grading of League Island, which latter operations are now in process of execution, and have so far met with the approval of the officers concerned. The company is also about to enter upon the construction of the exterior batteries at Fort Mifflin, and is interested in a variety of similar operations, too numerous to mention; but it may be said, generally, that whatever it has undertaken, up to the present time, has been carefully, scientifically and thoroughly carried out, never failing to give satisfaction. The company now employs sixteen or seventeen dredgers, costing from $10,000 to $30,000 each, six locomotives, with their cars and appliances, pile drivers, etc. It has a ship yard and steam saw mill at Camden, New Jersey, and employs altogether over 300 men, with a weekly pay roll of $4000. It aims at all times to secure the newest improvements in machinery, with a view to the thorough execution of its work. It was unostentatious in its manner of conducting business for fifteen years, its office being confined to a room about 12 feet square, but it recently removed to No. 10 South Delaware avenue, Philadelphia, a convenient and suitable location. The present officers are, John Somers, President, F. B. Colton, Treasurer, John Heins, Secretary, and William Somers, Superintendent.

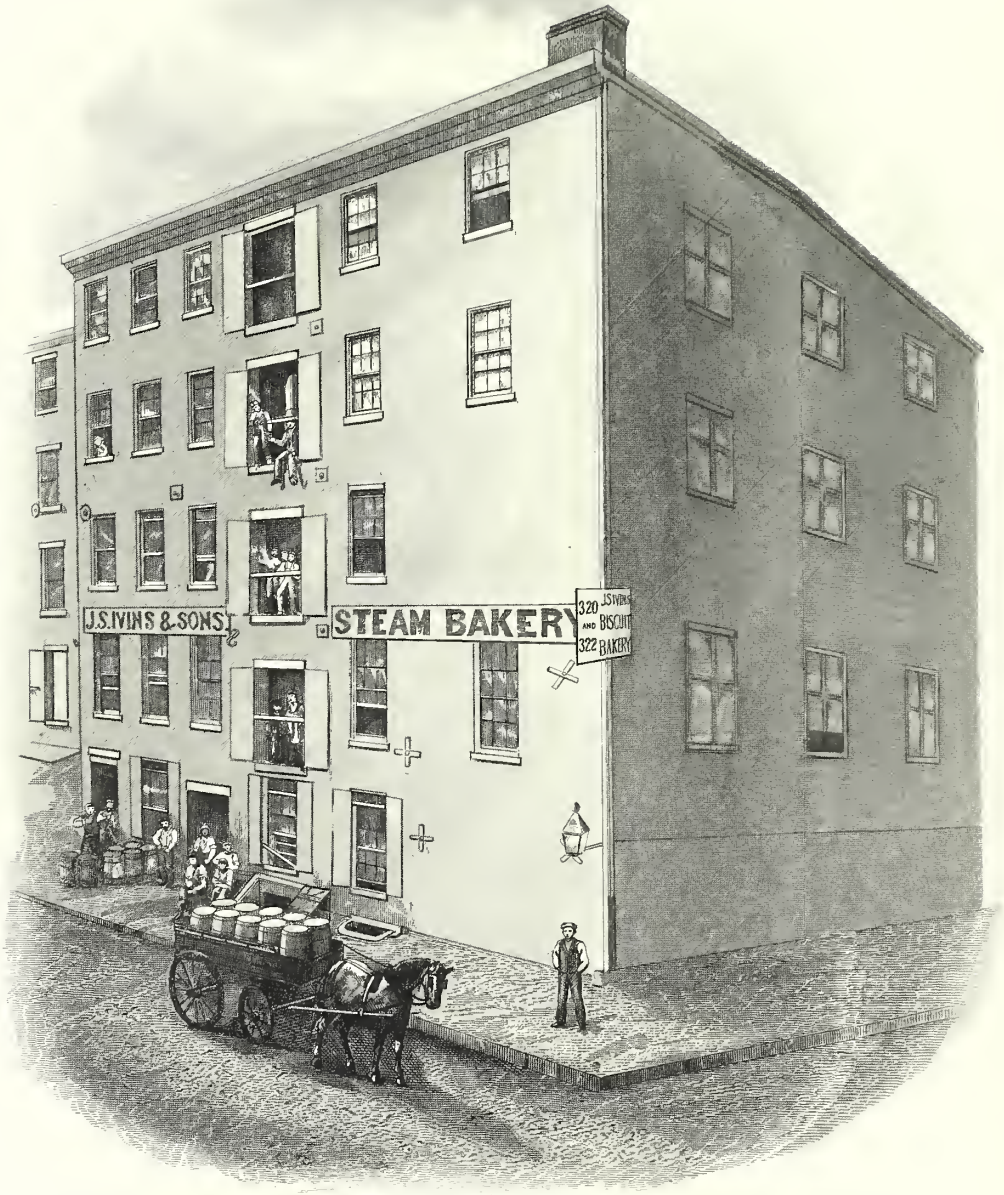
PRENTICE P. GUSTINE, Cabinet and Chair Maker, was born in Hinsdale, New Hampshire, January 6th, 1815. His father, who had been a soldier in the War of the Revolution, died, as did also his mother, soon after he attained the age of six years, and he found himself thrown upon the world to earn his own living as he best could. Having no other prospect, he removed to Charleston, New Hampshire, and entered into the service of an uncle, a farmer, who resided there, remaining with him till the age of sixteen. During this time, his work was arduous, but he nevertheless was allowed the opportunity of attending school for two months every winter, and in this manner obtained as good an education as the circumstances would permit. Being desirous of improving his circumstances, he left his uncle and went to Orford, where he engaged himself to another farmer, with whom he remained eight years. Tired of a farm life, he resolved to try some other occupation, and went to Bellow's Falls, Vermont, to learn the trade of a carpenter. He served his time there as an apprentice, for three years, and then, being a competent workman, resolved to go to the South in search of fortune. He lived in Georgia for two years, exercising his trade as journeyman cabinet maker, managing during that brief time, by economy and industry, to save the sum of $1500. With that capital he returned to his native place and commenced business on his own account. But success did not attend his efforts; he failed in a short time, losing the whole of his capital. Discouraged by this trial at Hinsdale, he removed to Philadelphia, where he commenced business anew, about the year 1845, in a very small way. He contrived, with the money he earned in that city, to pay off all the debts he had left behind him in his native village, though not legally bound to do so, as they were by that time debarred by the Statute of Limitations. This honorable conduct established his reputation and gained him friends who were able and willing to assist him. Having discharged his old liabilities, he returned to Philadelphia to begin again, with a clear conscience and energy and determination to succeed. His beginnings were necessarily of a very humble description; but, by good management and attention to business, he gradually found his trade increasing. He steadily enlarged his operations, employing more workmen, and soon saw himself on the road to fortune. Year by year he continued his activity and self-denial, till, at the present time, he is at the head of one of the largest and finest cabinet and furniture manufactories in the State. The factory is situated at the corner of Second and Race streets, and the annual amount of goods turned out is upwards of $150,000, employing, necessarily, in their manufacture, a large force of workmen, and, as a consequence, supporting indirectly a much larger number of people. He is one of the representative men of Philadelphia and the State, and, while forwarding his own interests, is contributing largely to the

general wealth of the community, by building up the trade of the city and adding to its manufacturing reputation. He was married in 1843, to Ellen S., daughter of Jacob Shell, of Philadelphia, by whom he has had four children, two daughters and two sons, one of the latter being at present associated with his father in the business. Beside his legitimate business occupations, he finds time to serve as President of the Citizens' Bank, and as Director of the Commonwealth Bank of Philadelphia.

THE PHILADELPHIA CAR WORKS of John G. Brill & Co., were founded in 1870, by John G. Brill & Son. The establishment was at first designed exclusively for the manufacture, on a small scale, of street car material; but, by degrees, the present line of business was entered upon. After an experience of nine months, the firm undertook a contract for building thirty-four cars, for the People's Railroad of Baltimore, and, soon afterwards, for fifty-two, for a St. Louis Company. Their work was approved, and other orders consequently followed. In a short time, they came from Cincinnati, from Oil City (for inclined cars), from Brigham Young, of Salt Lake City, and from Vera Cruz, Mexico. Their greatest triumph, hitherto, has, perhaps, been the fulfilment of an order for Vienna, Austria, for cars to run on a railway terminating at the Exposition building. In this they were highly successful, as the agent for the road pronounced their cars the best he had seen for a long time. They have obtained much reputation for the introduction of several novelties; among them is the patent journal box, which, by a combination of rollers, made of chilled iron or steel, resting on the top of the journal, reduces the friction to a minimum and greatly facilitates the starting of a car; and an apparatus, known as the Compound Lever, for opening doors, which adds materially to the comfort of passengers. The latter is controlled by a line, under the foot of the driver, which under all circumstances and in any position of the car, acts immediately. They have also been much praised, for the construction of a "palace car," placed by them on the West Philadelphia Passenger Railroad. It is extremely light, handsome, and convenient, reminding one of a Pullman palace car, being finished after the same model. This is the only establishment in the city of Philadelphia, for manufacturing narrow gauge and street cars. Until it got into operation our railway officials were obliged to send to New York, Wilmington, or elsewhere. The buildings in which the work is conducted are conveniently situated at Thirty-first and Chestnut streets, running back to Thirtieth street, having ready access to the Schuylkill, and being in direct communication with the various railroads running along its western bank. The arrangement of the works is admirably adapted to its requirements. Machinery of the most improved kind is employed, for facilitating the different kinds of work, for moving and loading the cars, and for transportation, while an elevator is in use, which is found to save a vast amount of labor. Though still in its infancy, the establishment already employs constantly over 100 men, and the continually increasing demand for its productions bids fair to necessitate, ere long, additions thereto. Great credit is due to the founders, for the enterprise and mechanical skill they have displayed.

J. G. BRILL, the senior partner, was born in Hesse Cassel, Germany, in 1817. His father, when seventeen years of age, was in the army and fought at the battle of Waterloo. He was a miller and gave his son the usual local education. After terminating that, he removed to Bremen, where he learned his trade and, at the age of twenty-three, emigrated to America. Here he obtained work at the cabinet-making trade, being employed by W. C. Allison & Sons. He worked as journeyman and master for seventeen years, when he withdrew to commence his present enterprise. At the commencement, he encountered many obstacles, but his tenacity of purpose and business energy enabled him to surmount them all, and he now has the fairest prospect of success.

JOB S. IVINS & SONS, Bread, Cake, and Cracker Bakers.—This business was begun by the senior partner in the firm, who, about 1836, bought the bakery of Lewis C. Buddy, situated on Front street, north of Vine, Philadelphia. The capital employed for this purpose was partly derived from what he had saved from previous operations, and partly borrowed. When the purchase money had been paid down, he found himself with eighty dollars left, as a working capital; but, by using his credit, he was able to make a commencement. The business, at this time, was insignificant, not requiring more than from six to eight barrels of flour daily; but, under his management, immediately began to increase, placing him in a position, at the termination of eighteen months, to repay the sum he had



Galaxy Pub Co. Philadelphia

Gates & Peterson, Portland

S. H. Dorris

borrowed. This, however, was declined, John Allen, his creditor, preferring to enter into partnership with him, and, in 1848, the firm of Ivins & Allen was inaugurated. For two years the business progressed favorably, but the great fire of 1850 burned down their establishment. The check, however, was but temporary, as they were well insured, and the junior partner, having bought in his own name the premises Nos. 321 and 323 North Front street, the firm rebuilt the bake-house, furnished it with new machinery, and continued their business as before. It gradually increased, year by year, till the outbreak of the civil war, in 1861, gave it a sudden and important impetus. During the struggle, the machinery was kept running night and day to fulfil army contracts, which had been secured. In the profits of this portion of the business, the junior partner declined to participate, being a Quaker. The amount of bread, etc., manufactured, during this period, required about 119 barrels of flour a day. This state of things continued till 1864, when J. S. Ivins bought his partner's interest and carried on the concern alone, for three years. He then admitted into partnership his two sons, Eugene and Charles, who had been brought up in the business, and were thoroughly acquainted with all its details, while possessing great natural abilities. The firm continued extending its operations, establishing a high reputation for the quality of their goods, which are extensively forwarded to all parts of the United States and to the West Indies. Their travelling agents visit all the principal cities of the Union. This duty devolves on the two juniors, who command a large trade, especially in the South and West. The present condition of the firm is highly prosperous; its financial position has never been questioned, and an increasing demand for its productions is shown. Thus from the very small beginnings, on borrowed capital, of thirty years ago, a manufactory has been created, which now ranks among the first in its department of industry in the country.

JOB S. IVINS was born near Burlington, New Jersey. His father, Elisha Ivins, was a prosperous farmer, and brought up his son to habits of industry and economy. He obtained what education he could at the village school, attending also to farm duties. When twelve years old, his father died, and the estate became much embarrassed, throwing him upon his own resources. He entered a dry goods store, at Schuylkill Eighth (now Fifteenth street) and Market streets, as an errand boy, remaining there for three years, till the failure of his employer threw him out of a situation. He returned home and, after another year's schooling, was apprenticed to a carpenter, with whom he served about three years. He then leased some property on ground rent, on which he managed to build, by using his credit, some sixty houses. The speculation left but little profit, and he was next engaged in superintending the building of houses for another party, contriving to save a little money, with which and the assistance of his future partner he bought out the bakery on Front street, with the results already described. He has always shown himself fair and upright in his dealings and a good man of business, who has done his share towards increasing the manufactures of Philadelphia.

ARTHUR COLBURN & CO.—The spice mills owned and occupied by this firm were originally started by the senior partner in 1857, who, with a borrowed capital of $10,000, commenced operations in a small room on Crown street, Philadelphia. His sales were comparatively small, but the business, by untiring diligence, energy, and the practice of the severest economy, was firmly established. During the second year, increased space being demanded, an eligible location was found at the corner of Ridge avenue and Broad street, and more than double the amount was manufactured and sold. In two years' time, these premises became too circumscribed, and, in 1860, he removed to his present factory on Broad street above Arch street, which he erected for the purpose. Here he manufactured a superior article of mustard, beside the preparation of ground spices in their purity, which is a specialty with this house. Up to 1866, the founder of these mills was their sole proprietor. At that date, however, he bestowed, upon two of his most competent and experienced employés, a joint partnership, equal in amount to one-half of the profits of the concern. They brought no capital but their energy, skill, and perseverance. These employés were Levi D. Brown and Washington Stilwell, the style of the house becoming A. Colburn & Co. From that time these gentlemen were constantly associated with the senior partner in the management of the business, until January, 1870, when the former purchased the interest of W. Stilwell; this, together with the share he already possessed, gave him one-half of the present concern, the firm name remaining unchanged. During a greater portion of the time that W. Stilwell was a member of the house, he travelled extensively through the South and West, canvassing whole States, and introducing

the various articles manufactured by the firm to the favorable notice of the trade. He is still employed in this capacity, and his services are most invaluable; for there is scarcely a house in this line of business that has not made his acquaintance. His journeys are by land and water in every variety of conveyance; nothing deters him, and he has succeeded in introducing his commodities to the very verge of civilization. No sickness, or the fear of it, has caused him to deviate from the route marked out, and the effects of his labors are evident, for he has made sales, often aggregating a half million of dollars, entirely on credit, and without the loss of a single dollar on the bills. The article of mustard here manufactured has been brought to the greatest perfection, and by its introduction to the community has very much superseded the demand for the foreign article. In those goods known as "Colburn's Select Spices," which are guaranteed under a heavy forfeiture to contain no adulteration whatever, they have done a large trade with the South since the war. At first, merchants in that section, dreading a repetition of the usual custom of receiving only an imitated or impure article, were very hesitating to purchase; but upon a critical examination of the goods in question, they doubted no longer. There is, however, a portion of the mercantile community who demand a cheaper article; and this house has devoted much attention to the discovery of harmless ingredients, by which the quality of the pure article can be diminished, without injury to the health of the consumer. In this they have succeeded so well, that those engaged in the same line of business are heavy purchasers of the "base mixture" to use in their own preparations. The business of the house is constantly increasing, and their sales are upwards of half a million dollars yearly; their factory gives employment to about forty operatives.

MANSFIELD & CO., Brass Founders.—This business originated with Edward Mansfield and John Fitzsimmons, who started in 1864, in a limited way, without any help, their capital being $1000. The factory, situated at its present location, No. 13 Second avenue, Pittsburgh, Pennsylvania, was then one story high, and 40 by 22 feet in dimension. Their business was at that time confined to mould castings of brass. At the end of the first year, they began to enlarge the building and employ hands. In 1866, they added about 40 feet in depth on the first floor, making it 80 by 22 feet, with the same height. In 1863, they added another story, and began to introduce machinery. Their engine was of five horse power. At that time, they commenced finishing work and the manufacture of steam goods or engine trimmings; such as steam whistles; globe, angle and safety valves; cylinders, gauge cocks and oil cups. From the beginning, they have been manufacturing anti-friction or "Babbitt metals," the production having steadily increased both in quantity and quality. At first, they used but 26,000 pounds annually, but now they consume 200 tons in the same time. In 1870, another story was added to the building, and more machinery introduced. They also commenced making plumbers' brass work; such as compression and ground bibbs, stocks, basses, cocks, etc. In 1872, John Fitzsimmons withdrew, when a new association was formed, composed of E. Mansfield, J. B. Bessonnette and J. S. Lloyd. This change gave a new impetus to the business, which has since then increased one-third. They have on hand the largest contract ever given to any house of the kind in Pittsburgh, being that of supplying the brass work to the new Water Works, of which Mr. Hartupee is building the engines. Their trade now extends to all parts of the country, the quality of their goods being such that they are in constant demand, and even Boston, the headquarters of the brass foundry trade, sends them orders. The engine now in use is of sixteen horse power, and they have eleven brass-furnaces, in place of the two they commenced with, while the number of operatives employed reaches forty, and they estimate their present capital at $40,000. The distribution of work is as follows: the engine, as a matter of convenience, is placed in the basement; the casting is done on the first floor, and the brass finishing on the second and third floors. It will thus be seen that, whereas about nine years ago they commenced with a capital of $1000, employing no hands, their business now requires a capital of $40,000 and the employment of forty workmen. They attribute this marked success to the superior quality of their goods, which enables them to excel the most noted manufacturers.

EDWARD MANSFIELD was born in Pittsburgh, February 18th, 1842. He was educated in the common schools of that city, where he remained till the age of thirteen, when he began to learn his trade, completing his apprenticeship at nineteen. During this period, however, he attended night school, to obtain a business education, and, on the termination of his apprenticeship, spent three months at the academy in Allegheny

City. He then commenced the business in which he is now engaged. He is at present a director in the Workingmen's Mutual Savings Bank, and takes an active interest in the Diamond Savings Bank and the Enterprise Savings Bank.

WILLIAM R. STEWART, Morocco Manufacturer, conducts operations at Nos. 435 and 437 York avenue, Philadelphia. The business was founded in 1838, by his father, B. D. Stewart, at this location, and he conducted it until 1860, when his son—who had meanwhile been thoroughly instructed in all its various details—was taken in as a partner, and the firm was thereafter known as B. D. Stewart & Son. In 1872, the senior partner retired; and since that date his son has become sole owner and director of the establishment. In the manufacture of leathers, especially in moroccos and kids, Philadelphia stands at the head of all other cities in the Union; at least four-fifths of those annually produced in the country are worked up and finished in her establishments. Nearly two million skins are yearly converted into leather, and the excellence of quality is not less remarkable than the enormous quantity. The goat-skins are obtained from different countries; Madras, Cawnpore, and Patna, in the East Indies; the Cape of Good Hope; Curaçoa, and other islands in the West Indies; but chiefly from Tampico and other ports in Mexico; most from the latter section being known as "Tampicos." The goat-skins from Mexico are characterized by their large size and weight; those of Curaçoa are smaller, but generally of very superior quality, and these last are principally used in the fabrication of kid gloves and gaiter uppers. Boston and New York import the skins, whence they are brought to Philadelphia, converted into morocco, and a large number returned to Boston to be made up into shoes. Cities to the East and West are heavy purchasers in the Philadelphia markets, as she is the centre of this trade. Her climate and water seem most admirably adapted to this manufacture. Only the finest skins are here manipulated, viz.: Tampico and Curaçoa; the aim being to produce the highest grade of moroccos and kids. On this principle the house has established its reputation; and all moroccos which bear the initials of the original proprietor B. D. S. in German text) are eagerly sought for, whenever offered for sale. The greatest care is exercised in every successive stage of manufacture, looking chiefly to the quality of the article produced, rather than to the quantity which might be—during the same space of time—worked up and finished. All throughout the country this brand of skins is favorably known and inquired for. In Cincinnati, one of the largest and most reliable houses in the country—J. J. Brown & Co.—are agents for Stewart's moroccos. The high rank which the house has gained, among Philadelphia manufacturers, who are themselves so celebrated in this particular calling, is a proud position, and can only result from the strict care that is exercised throughout upon the various articles fabricated, and the employment of none but the most skilful operatives. The proprietor has had large business experience, and possesses thorough knowledge of the various details of his vocation.

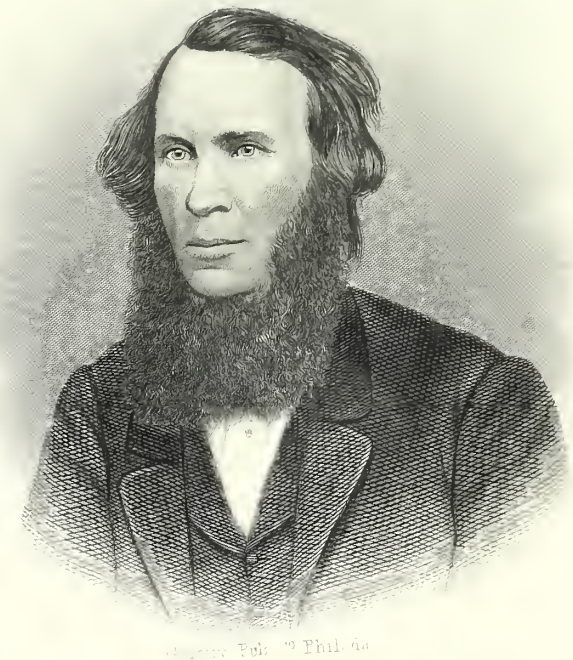
HAIG'S NORTHERN LIBERTY POTTERY was founded in 1813, by Thomas Haig, Sr., the father of the present proprietors, who had emigrated a few years before from Scotland, where also the present senior partner was born. He had become a proficient in his business in his native place, Preston Pans, and had worked at his trade as a journeyman in this country for a few years. He first established himself in a small building near the corner of Front and Maiden streets, Philadelphia, as a general manufacturer of earthenware. Trade being very much depressed at the close of the war of 1812, he relinquished his business on Front street, and removed to Fourth above Poplar street, where he remained until his death, in 1831. The business was carried on for eighteen months by his widow, and then passed under the management of the sons and present proprietors, James and Thomas Haig, who remained at the old stand until 1843. During that year they removed to Second street above Laurel, and erected a small pottery on ground previously purchased by them. It was about one acre in extent, and is now nearly covered with buildings. An engine of eight horse power is used for grinding clay, glazing, etc., and about thirty-five men and boys are constantly employed. The manufacture is of stone, yellow and earthenware, and also of fire brick. They also make portable furnaces and cylinders, and tiles of all sizes. In the ware line, every conceivable variety is manufactured; jugs, jars and dishes, in short, every kind of utensil used by housekeepers and cooks; or, by chemists and manufacturers, for processes of art and science. Of fire-brick and tile, all sizes and shapes are made, suitable for steel furnaces, rolling

mills, boilers, etc. The business has grown from a small beginning to very large proportions.

Both the proprietors, who are men of high character and greatly esteemed, were brought up to the business, and continue to take their part with the most industrious workmen. The red clay for earthenware is purchased in the city, while the white, of which stoneware and fire-brick is made, is obtained from New Jersey and Delaware. The trade is general through the United States, their ware being distributed to the furthest limits of the country. In addition, a very heavy local trade is carried on, both wholesale and retail. Through the quality of the goods and the wise management of the owners, the business is increasing constantly, while they strive to keep pace with the ever increasing demand for new varieties of utensils, made necessary by the growing demand of manufacturing art.

GEORGE J. BURKHARDT, Brewers' Engineer and Constructor, was born in Philadelphia, in 1813, of German parents. He received a thorough education, completed at the Plainfield Academy. On leaving school, he entered a dry goods store, as salesman, and afterwards a drug store, as clerk. He next apprenticed himself to a house carpenter, with whom he served his time. At the expiration of his term, he borrowed a little money and commenced business for himself, in a small shop, at Logan and Green streets. He was unsuccessful in this, and again worked at his trade as a journeyman for one year. During that period he made the acquaintance of William Gaul, the well-known brewer, who, struck with his enterprise, gave him the entire charge of his work. He made numerous improvements on the brewing apparatus, and invented some labor-saving devices. His inventions became known to other brewers, and his services were in great demand. He undertook similar work for Massey, Collins & Co., and, in 1853, he effected a revolution in their business, which gained him a reputation throughout the United States. His occupation now became that of Brewers' Engineer and Constructor, and his establishment was the only one in the country where vat building was made a specialty. His trade increased, keeping him busy in supplying breweries with vats and constructing tanks for railroads. Orders were received from all parts of the country, and even Boston, where there were several similar establishments, gave the preference to his work. He now does a large trade with New England, and is constantly shipping goods to Cuba, the extreme West, California and Mexico. His factory is fitted up with excellent machinery, much of which is of his own invention, or improved by him. His sons, William H. and Miller Burkhardt, are now his partners; both are energetic men of business, and destined to succeed their father. The manufactory consumes annually 1,000,000 feet of material, and is capable of constructing, every year, 900 tubs of various sizes, one of which, made for a colliery, has a capacity of 100,000 gallons. His pattern of stock-vats, for brewers, has been generally adopted. In addition to his special business, he manufactures vessels for rolling mills, laboratories and other manufactories. He has now become a Consulting Engineer, much of his time being occupied in giving advice and superintending the arrangement and setting up of vats, etc., in breweries in different parts of the country. During his long and prosperous career of thirty years, he has sustained but one loss: that occasioned by the destruction of his works by fire, in 1852.

GROVE BROTHERS, Iron Founders and Workers, commenced their business by a partnership, entered into in 1840, by John Peter and John Grove, who began the iron trade in Danville, Montour county, Pennsylvania, by establishing what was known as the Columbia Furnace, continuing that association for ten years. In the meantime, the Montour Iron Company, of Danville, in which they were stockholders, had become much embarrassed in its affairs, and the firm was persuaded, in 1850, to undertake its direction, in the hope of extricating it from its difficulties; but ultimately without success, as it was obliged to suspend operations. In the last named year, a younger brother, Michael, was admitted into partnership, when the firm assumed its present title. In 1852, they bought out a rolling mill, then existing at Wilkesbarre, Pennsylvania, and transferred the same to Danville. Their long experience in iron manufacture, and their business ability, rendered them eminently capable of successfully conducting this branch of industry. Independently of the business directly carried on under their name, they are partners in the Iron and Steel Works of Danville, and possess an interest in iron and coal mines in Pennsylvania, Maryland and Canada. Their different establishments represent, in the aggregate, most extensive industrial interests, and some idea may be formed



Geo W Carr

of their vastness from the fact, that their various works consume annually about 11,000 tons of iron, and give employment to from 5000 to 6000 operatives. Thus, in the space of a little over thirty years, they have, from comparatively humble beginnings, increased their business till the firm has become one of the largest and most prosperous in the State. Among the causes to which they attribute such flattering results, are the perfect accord of all the members of the firm and their cordial co-operation in the various enterprises engaged in; to this also may be traced their success in organizing and managing large bodies of workmen. The three brothers, originally composing the company, are of Swiss extraction. The eldest brother, John Peter, died in 1864, leaving the business to the younger members of the firm.

JOHN GROVE, the present senior partner, was born in Fredericksburg, Lebanon county, Pennsylvania, August 29th, 1815. He is the son of John and Eliza Grove, who had a family of seven children. His early life was passed chiefly at home, where he obtained an education in the common schools of the town, completed afterwards at Washington College. During the intervals not employed in his studies, he assisted his father in his business of general storekeeper and proprietor of a flour mill, occupations which are still continued by two other brothers.

MICHAEL GROVE, the youngest partner, was born in the same town, May 20th, 1821, and passed his early life similarly to his elder brother, though his education, commenced in the schools of his native town, was terminated at Gettysburg College. He was married, in 1842, to Catharine Houtz, of Fredericksburg, by whom he has a family of two children. The lives of the three brothers have been so much alike, that a biographical sketch of one represents with tolerable accuracy the points of interest in the history of the others, and they have been so intimately connected with each other, in their business, that the success they have achieved is to be ascribed equally to the persevering efforts of each.

GEORGE W. CARR, Umbrella Frame Manufacturer, commenced the business in which he has been so successful in 1842, while keeping a small dry goods store and a book bindery, in conjunction with his brother. At that time, the use of whalebone, in ladies' dresses, assumed large proportions; and, foreseeing the importance and probable extent of its manufacture, he abandoned the book binding trade, and devoted his attention, in connection with his other business, to the preparation of whalebone for the market. He first began with primitive tools, limited to a shoemaker's knife and a mallet, but soon after replaced them by fitting machinery, invented for the purpose by himself and his brother. In those days, whalebone and rattan were the only materials used for the ribs of umbrellas, and, together with the employment of the former in ladies' dresses, a large demand was created, which soon placed the firm in a highly favorable position, not obtained, however, without hard work, as the senior partner was wont to remain at his occupation as much as sixteen hours a day. Such excessive toil produced its natural results, and in a few years he was forced to leave his business for a while and repair to the country. Finding, on his return, that the two branches of his trade interfered with each other, he relinquished the dry goods and threw his whole energies into the manufacture of umbrella frames. Competition and other causes operating against him, the firm was compelled to abandon the business. The brothers parted, and George W. Carr assumed all the liabilities of the concern, which he eventually discharged in full, gaining a reputation for probity and energy that proved highly advantageous to him. He inspired so much confidence that he was enabled to borrow a capital of $10,000 with which to start afresh. In 1855, he began the making of rattan into umbrella frames, and, for that purpose, invented new machinery. He succeeded in producing the best article in the country; but the price was too high to allow of profit, and it was abandoned. In 1857, he formed a partnership with Samuel Warren, for the manufacturing of whalebone frames, with such success that, in 1862, the business was removed from Willow and Front streets, Philadelphia, to its present location, at the corner of Twelfth and Noble streets. The business has required 230,000 pounds of whalebone in a single year. This article has now been superseded by steel, and he was among the first to perceive the advantages of the new invention. He labored energetically to perfect and introduce it, but at first with little success, though he eventually triumphed, and his make of frames acquired a great reputation, his brands of "Eureka" and "Storm King" having an immense demand. Though not the inventor, he has done much to perfect the manufacture of steel frames, and it is mainly due to his exertions that the present low prices have been reached. The annual consumption at his factory amounts to nearly 200,000 pounds of steel and 75,000

pounds of brass wire, employing 200 hands. He possesses large mechanical invention and skill, and his factory is provided with all the machinery that can be needed, which, though not wholly invented by himself, has been so improved by him that no other establishment in the country can equal it. In 1870, the firm was enlarged by the admission of Gilbert S. Moore, a nephew of the head of the house, who had been a clerk in the factory for a number of years. His knowledge of the business, and his natural ability, have afforded great relief to the principal, whose energy and perseverance have enabled him to build up the largest manufactory of the kind in the country.

He was born October 31st, 1816, in Philadelphia. His father was one of the earliest saw makers in this country; but, being unsuccessful, left his family at his death in restricted circumstances, and the son was soon obliged to support himself. He obtained but a limited education, and, at eleven years, engaged as an errand boy, remaining in that capacity for three years, when he was apprenticed to a book binder, with whom he served for seven years. At the expiration of his term, in 1836, he worked for a year as journeyman. After varying fortunes, he left the city to go to New Berlin, Pennsylvania, but returned, in 1842, to Philadelphia, where, while following his trade, he opened a small dry goods store, in conjunction with his brother. He was married, in 1863, to Fanny, daughter of William Harvey, of his native city, by whom he has had four children.

PETER BALTZ, Brewer, commenced business in 1851, forming a partnership with his brother, and brewing on a small scale at the place known as Military Hall, on Third below Buttonwood street, Philadelphia. At first, he only turned out twenty barrels a day, in the winter time; but the good quality of his productions soon increased his business, till, in 1856, he found the premises too small for his purposes. In that year, he built a new and commodious brewery at Thirty-first and Thompson streets. Although he lost some money at first, his industry and attention to trade soon retrieved his losses. He also had good fortune, and, once on the right road, steadily advanced till the business is now estimated to be worth $300,000.

He was born in Oermingen, Canton of Sarreunion, Department of the Lower Rhine, France, August 24th, 1825. His father was John Frederick Baltz, born at the same place, April 10th, 1778, and his mother was Salome S. Keeskastel, born March 29th, 1779, and married on November 6th, 1801. In 1831, he was sent to school in his native place, continuing there till 1840, when he was apprenticed to a tailor, with whom he remained till 1843. On the 6th of February, in that year, he left home and embarked for New York, at Havre, in the ship "Utica," arriving in this country at the end of the following April, with a five franc piece in his pocket as his sole property. He obtained employment on the first day, at seventy-five cents a week. He worked hard day and night in that situation for a year, when he went to Philadelphia, and stayed there till 1849. He then returned to New York, remaining there till 1851, when he once more moved to Philadelphia, and finally settled there. In the same year, he joined his brother and commenced the brewery. He was married to Maria M. Birkenstock, of Bechtheim Rhein Pfalz, December 4th, 1857, and has had a family of four children. He has had many troubles in his family, from sickness, etc., but, on the whole, has been remarkably prosperous. He is a member of the Protestant Lutheran Church, and, in his private character, is charitable and generous. Few men can boast that, in the space of thirty years, they have risen from five francs to the possession of a fortune of $300,000.

THE PITTSBURGH CITY GLASS WORKS, Cunninghams & Ihmsen, Proprietors, were founded in 1849, by Wilson Cunningham & Co., the members of the firm being Wilson Cunningham, George Duncan, D. Cunningham and D. Ihmsen. They started with a capital of $6000, in a small factory situated at Twenty-sixth street, South Side, or Birmingham. The premises at that time consisted of a main building, 55 by 65 feet, and a flattening house, of 40 by 90 feet. They only manufactured window glass, and kept but eight small pots in operation, employing forty men and producing about eighty boxes of glass per day. In 1854, they bought a bottle factory, owned by Harcum & Co., which they tore down and replaced by the present one, in the same year, selling to Robert Cunningham an interest in the business, equal to one-third of the profits. The firm continued thus till 1864, when George Duncan sold his interest to D. O. Cunningham, and D. Cunningham dying, in the same year, his was purchased by the firm, which has experienced no change since that time. The

Manufacturing Establishments, Lowell, Mass.

business has steadily increased from year to year, and, since its commencement, the firm has built two new factories, one for the manufacture of window glass and the other for that of bottles, each of them being 85 feet square. They now employ 280 operatives, and manufacture about 300 boxes of glass per day. They work twenty-eight pots, each one being double the size of those they commenced with. Their bottle house is the largest in the country, and produces about 14,400 bottles a day, employing thirty-two blowers and thirty-eight boys. The pots in this department contain one and a half tons of metal, and are filled six times a week. The pots themselves are made of German and American clay, mixed in equal proportions, and burned from fifteen to twenty times. In the window glass house, they employ twenty blowers and thirty-four other hands. They keep two furnaces in operation, and, in addition to the above, have a building for grinding fruit jars, 40 by 70 feet. The works consume annually 302,000 bushels of coal, 1000 tons of soda ash, 3400 tons of sand, and 604 tons of straw, for packing. In 1872, they built a flattening oven, at a cost of $35,000, said to be equalled in size by only one in the world. It has a capacity for flattening eight sheets, 46 by 80 inches, at one revolution of the wheel. For the current year (1873), it is calculated their sales will amount to over 9000 gross of soda water bottles and 5000 gross of fruit jars, besides keeping up a large stock of druggists' ware, wine bottles and demijohns. Their weekly pay-roll now amounts to $6000, a sum equal to the capital the concern was started with. Their business radiates to all parts of the United States, and extends, to a considerable degree, into Mexico. It employs at present a capital of $500,000, composed of both personal and real estate.

WILSON CUNNINGHAM was born in Allegheny county, Pennsylvania, February 22d, 1812. His school education terminated on his reaching his twelfth year, when he entered the glass works of Wendt, Ensell & Ihmsen, to learn the business. At sixteen, he commenced blowing, doing the work of a man. He continued in that position till the business was sold to Thomas Ihmsen. After that, he acted as foreman for C. Ihmsen for a period of seven years. At the age of twenty-seven years, he built a steamboat, which, however, proving unprofitable, he sold it and commenced trading on the Ohio river, from Pittsburgh to New Orleans, on a flat-boat, dealing in Pittsburgh goods, such as glass bells, castings and scales, the time employed in each trip being about ten months. In 1849, he abandoned that pursuit and entered into the glass manufacturing business. He has been a director in the Merchants and Manufacturers National Bank for the past sixteen years, and is also a director and treasurer in the City Insurance Company.

D. IHMSEN was born in Pittsburgh, August 19th, 1826. He was educated at the Western University, in the same city, where he remained till the age of twenty, when he became clerk on one of the Monongahela river steamboats. He occupied that position till 1849, when he engaged in the glass business, as a member of the firm of W. Cunningham & Co. Independently of this business, he has exhibited much interest in matters of a public nature. He has been Treasurer of St. Paul's Orphan Asylum since 1855, President of the City Bank of Pittsburgh, and member of the Board of Directors of the Western Insurance Company.

ROBERT CUNNINGHAM was born in Allegheny county, Pennsylvania, February 27th, 1816. His educational advantages were limited, and he commenced, at sixteen years, to learn the trade of window glass blowing, with John McKee, whom he served for four years and seven months, having commenced to blow at the age of seventeen. After learning his trade, he joined his brother, in trading between Pittsburgh and New Orleans, and, in 1854, joined the firm of W. Cunningham & Co. He is a director in the Union Savings Bank, of Birmingham; served one year in the Birmingham City Council, and three years as school director.

DOMINICK O. CUNNINGHAM was born in Pittsburgh, November 12th, 1834, and was educated in the public schools of his native city. At sixteen years of age, he became book-keeper for W. Cunningham & Co., and, in 1864, bought out G. Duncan's interest in that concern. He is a director in the Castle Shannon Narrow Gauge Railroad and Mines. He was a director in the Farmers' and Mechanics' Bank, of Birmingham, from 1868 to 1873, but resigned, owing to press of business.

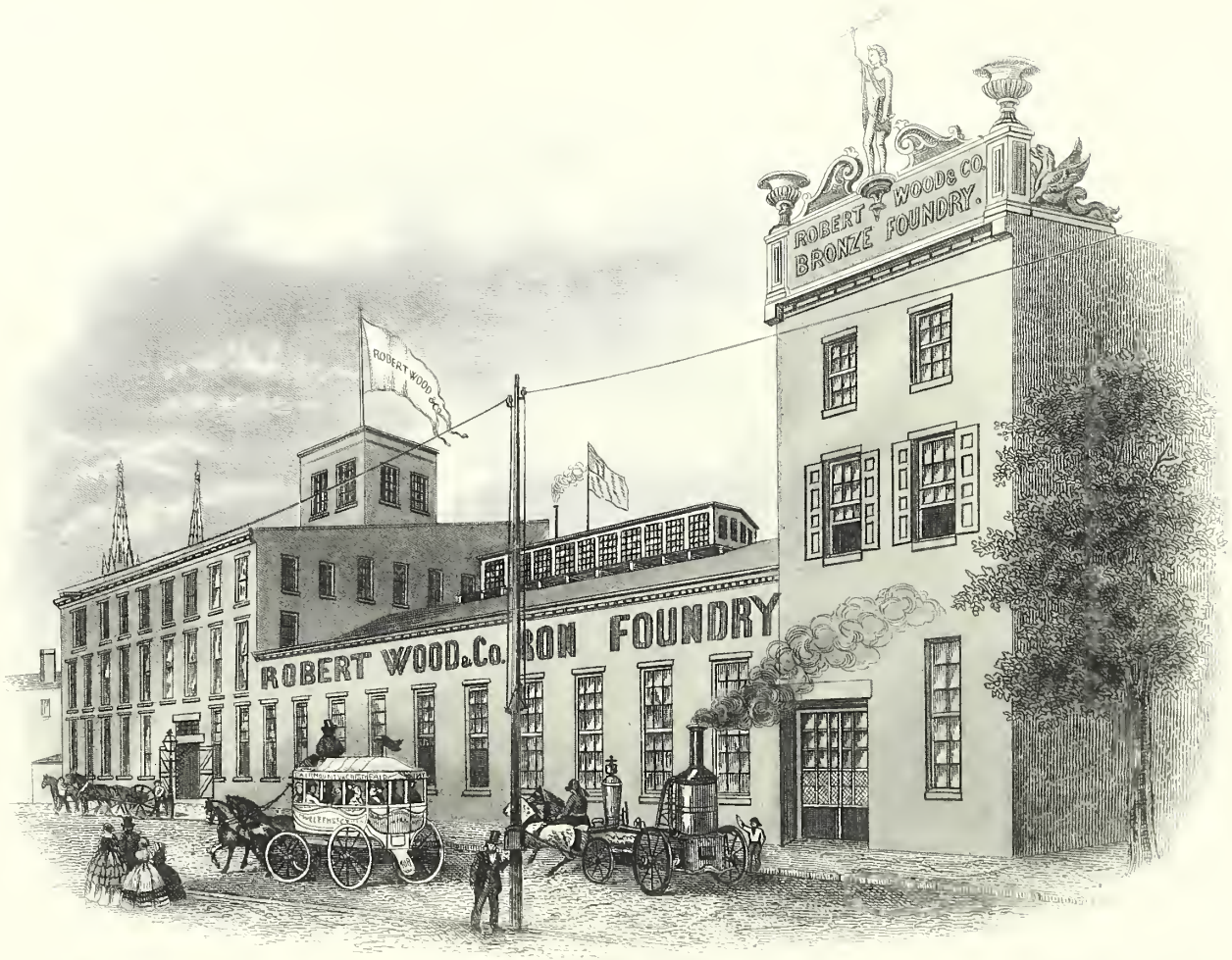
JOSEPH D. McKEE, Manufacturer of Germantown Knit Goods, of Philadelphia, derived his first notion of embarking in his present business from having been employed as book-keeper by Thomas Dolan, engaged in a similar business in Kensington. In 1865, he resigned that position and commenced on his own account. The premises where he first established himself are the same as those

now occupied by him, and are situated at the corner of Harrison and Howard streets, in the northern part of the city. His first step was to invest a portion of his capital in the purchase of a lot, at that place, its dimensions being 130 by 110 feet, and, upon this roomy site, he erected the present complete and spacious edifice. The main building is 130 by 35 feet, and has four floors, all fully occupied with machinery. In addition to this, there is a wing, of two stories in height, and 75 by 35 feet in area. The machinery used is of the most perfect description, comprising all the modern improvements. With a view to secure the best that could be obtained, he sent a practical machinist to Europe, to select the most eligible he could find, at the same time instructing him to make engagements with skilled artizans, who were sent out to this country. By these judicious arrangements, he succeeded in establishing, from the first, a mill inferior to none in regard to completeness and convenience, and the superiority of its machinery, which latter consists of twenty-six broad weaving looms and nineteen knitting looms, of various sizes suited to the different kinds of work required. In the dullest times, these looms are all kept constantly employed, during the day, while in busy seasons they are in operation both day and night. He was fortunate, at the commencement of his career, as he found in J. M. Billings, the well-known commission merchant of New York, a friend whose valuable advice was of great service to him, and also in beginning at a time when the prices of all manufactured goods were high and the demand great, leading to enormous and profitable sales. This continued all through 1865; and, though some subsequent seasons were less generally prosperous, he was always able to fully maintain his ground. He makes his sales entirely through commission merchants, confining himself exclusively to the manufacturing department, and giving it his individual attention. His belief is that the best method of protecting home interests is to produce articles equal if not superior to those imported, and, to effect this object, he employs, regardless of the cost, the best machinery, the best material and the best workmen that can be found. The soundness of this policy is discernible in the results, as by it he is enabled to produce goods which have gained him a wide celebrity, and have tended to increase his sales to such an extent that, in 1872, they amounted to the large sum of $325,000 per year, and are still increasing. During the eight years he has been engaged in this business, he, like many others, has had his trials; prices have declined when heavy stocks were on hand; but, with energy and judicious management, he has never failed to escape the peril. The system by which he carries on his business is doubtless the main cause of his success, and has enabled him in many cases to surpass his competitors.

He was born in Philadelphia, August 6th, 1839. His father, William McKee, was a member of the dry goods house of Thayer, Bryan & McKee. His education was completed at the Central High School of Philadelphia, where he graduated, in 1856, with distinction. He then entered the counting room of F. V. Krug & Co., as assistant bookkeeper; but, in the space of one year, rose to the position of head bookkeeper, and, on the failure of the firm, in 1862, was appointed one of the assignees. He subsequently engaged as bookkeeper with Thomas Dolan, with whom he remained till he went into business. A courteous and warm-hearted man, he is highly respected, both in his private and business relations.

THE PHILADELPHIA ORNAMENTAL IRON WORKS derive their origin from a little blacksmith's shop, still in existence, but hidden amidst the buildings of the present establishment. Robert Wood, after learning his trade, began business in that shop, in 1839. Whatever capital he possessed was very small and due to his economies as a journeyman. At first he commenced by working at his own forge, and employed but one boy to assist him. The first articles manufactured there were wrought iron window guards, awning posts, and various other forgings, and he bought his iron by the hundred-weight. He next undertook the manufacture of iron railings, substituting for the stiff patterns, then in use, others of elegant designs, which he found could be produced as cheaply. Reputation was the result, and business increased. More help was engaged, the premises were enlarged, and the infant concern began to prosper. Iron was bought by the ton, and railings turned out in large quantities. Articles of ornamental housework were now added, and these were succeeded by a great variety of other objects, in iron, such as vases, garden chairs, arbors, summer-houses, fountains, etc., etc., in all of which a degree of taste was displayed that was a novelty in those branches of manufacture. The valuable services of an accomplished designer were secured, and his services retained until his death, when he was succeeded by a sculptor of reputation. Year by year, the demand for

R. WOOD & C.° MANUFACTURERS OF DECORATIVE IRON WORK
ORNAMENTAL IRON WORK FACTORY
ROBERT WOOD
ROOF
ROOF
ROOF



Robert Wood & Co. Iron & Bronze Foundries Philadelphia

castings and forgings increased, the business grew rapidly, and new buildings had to be erected to accommodate it, until the establishment attained its now vast proportions. At the present time, the works give employment to nearly 300 hands, consume 1200 tons of cast-iron, 1800 tons of wrought-iron, and burn 438 tons of coal annually; and, in addition to the countless variety of other articles, many hundred miles of iron railings are constructed every year in the establishment. The premises are situated at No. 1136 Ridge avenue, below Spring Garden street, and are partially fire-proof. The engravings, accompanying this sketch, will give the reader a better idea of the exterior appearance of the building than any mere verbal description; but a brief notice of the interior arrangements will prove interesting. Near the entrance to the building, on the ground floor, a vast collection of dogs of all descriptions is to be seen. Mastiffs, Newfoundlands, Greyhounds, and others, all cast in iron, are there, all in the most natural and pleasing postures; while, round the walls, are suspended various specimens of the founder's art, such as parts of railings, medallions, etc., brilliantly painted and gilt. Further on, we reach a splendid iron staircase, of Moorish design, which leads to the show rooms on the second floor. These consist of a spacious hall, filled with beautiful objects of every description that can be made of iron. Fountains, twenty feet high, and approached by terraces, throw their jets into the air, whilst zinc water-fowl float in their capacious basins, amidst aquatic plants of the same metal, delicately painted to imitate nature. Arbors and rustic furniture, made of iron, and deer, fashioned of zinc, attract the eye amongst colonnades of lamp posts in endless variety of size and design. Household articles, of every class, and stable fittings, handsomely ornamented, are there, the whole forming a collection of genuine works of art. In an upper room, properly lighted, sits the draughtsman, whose designs, after approval, are transferred to the pattern room, where they are copied in wood, and thence passed to the moulding room to be reproduced in iron. The lathes, drills, stamping machines, hammers, etc., are driven by a beautifully finished engine of thirty horse power, contained in one of the largest and best appointed engine rooms of the city. For forging purposes, a large blacksmith shop is attached, and even the packing cases are made on the premises. All the patterns ever made in the place are preserved in a fire-proof building, erected for that purpose, and their money value amounts to hundreds of thousands of dollars. Lithographs are also made of every article manufactured on the premises. This collection fills two rooms, and is valued at $30,000. The special feature, to which must be attributed the extraordinary success of this establishment, is undoubtedly the blending of art and beauty with utility, in the commonest articles of every-day life. A simple lamp post may be as enduring and useful, as a work of art, as it would be, in its primitive form of a straight unornamented iron tube. This idea, once understood by the public, a natural desire to possess such articles was felt, and, as a consequence, a demand was made for them upon the establishment which could produce them. Therefore, as all the objects sent out from this foundry were constructed upon this principle, it may be said to have excelled its competitors in every branch of the business. Although in a commercial point of view it may be regarded as a mere adjunct, yet the casting of colossal bronze statues is the feature which has been the greatest source of renown to this foundry. Some eight or nine years ago, the proprietor conceived the idea that he could cast the largest size statues in bronze. Being satisfied on this point, he procured the assistance of men skilled in this most difficult process of the founder's art. An air furnace was erected, of the largest dimensions, all the necessary moulds and implements were provided, a pit, ten feet deep, was dug, and the bronze foundry was ready for work. In the famous bronze foundry of Bavaria, the ceremony of casting a statue becomes a pageant: princes, high officials, and prelates are often present, and prayers are offered up for the success of the operation; but here the matter was conducted quietly and in private, followed, however, with the most satisfactory results. The first casting was a complete triumph, immediately establishing the reputation of the foundry, and bringing in orders from all quarters for similar works of art. Many of the great cities of the Union already possess specimens of this art, till then unknown in this country. New York, Brooklyn, Cincinnati, Washington, Pittsfield, Newport, Philadelphia, Carlisle, and Gettysburg, are all adorned with treasures from this source, and many other cities are waiting their turn. The establishment of these works is an era in the artistic history of Philadelphia, and the development of this latest idea an epoch in the life of their founder, whose record, since the age of twenty-six, is intimately blended with the establishment he conducts.

He was born on the 4th of July, 1813, in the old district of Spring Garden. Leaving school when quite young, he was apprenticed to a blacksmith in Southwark. After serving his full time, he worked

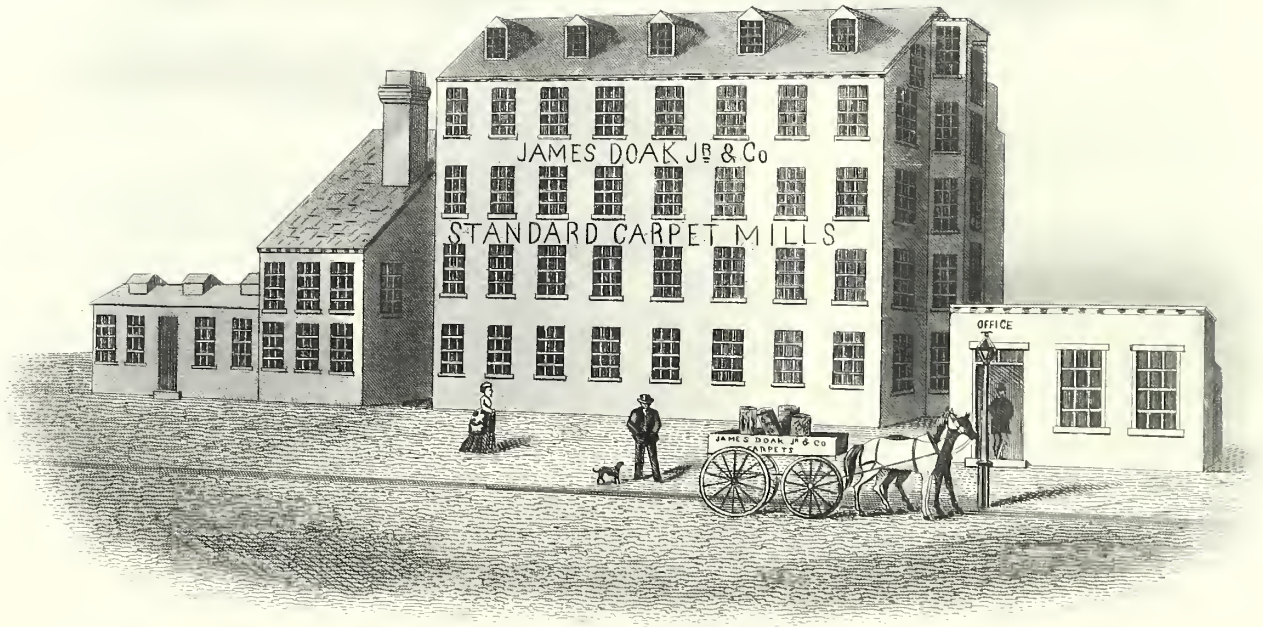
for his employer as journeyman, till 1839, when he commenced business for himself, laying the foundation of the great industry now known as the Philadelphia Ornamental Iron Works.

JAMES DOAK, Jr. & CO., Proprietors of Carpet Factory known as the Standard Mills, Philadelphia, commenced business in the Spring of 1866, a partnership being formed between the senior partner and Mr. Arrott. They began in a small way, by renting a portion of the factory of Israel Foster, at Frankford, at first employing about sixteen looms. They remained, however, but a short time in that location, starting a factory, at the corner of Twenty-second and Carlton streets, where they continued in the business till May, 1868, when they rented the premises, on the site of their present factory. These were burned down, December 23d, 1872, but the firm, being sufficiently protected by insurance, soon repaired the loss by purchasing the whole of the property, on which they erected the buildings now standing. The lot occupied by them has an area of 28,350 square feet, and is situated at 566 East Norris street. The main building is of brick, five stories high, and 83 by 44 feet in dimension. Adjoining this is a two-story engine house, 20 by 20 feet, the upper portion of which is used as a store room. Another building, the picker house, is three stories in height, with an area of 53 by 34 feet, and is also used for the finishing and drying department. The dye house is also a separate structure, in proximity to the main building, and 42 by 30 feet in area. The engine used in this factory is of fifty horse power, with a boiler capacity of sixty horse power. The first and fourth floors of the principal edifice are used, exclusively, for spinning operations, the rest of the building being appropriated to weaving and carding. All the spinning for the manufacture is done on the premises, while other factories are supplied with considerable quantities of yarn. In this department over 2000 woollen spindles are used, and between 300,000 and 400,000 pounds of wool annually consumed. The number of looms in use is forty-eight, and the average force employed is about 120 hands. The annual product of the establishment is about 150,000 yards, of different classes of carpets, which for their fineness, texture, and general excellence have acquired a favorable reputation in the market. The business has steadily increased since the commencement, the care taken in the manufacture, and the perfect knowledge of the business possessed by the senior partner, being among the chief causes of success. He has the entire superintendence of the manufacture, while his partner confines his duties to the financial department.

THE former was born in Londonderry, Ireland, June 14th, 1837. His father emigrated to this country in 1844, and, after a brief residence in New York, removed to Newark, New Jersey, where he engaged in business. He afterwards went to Fall River, Massachusetts, where he remained, for about eighteen months, subsequently going to Philadelphia, where he commenced the manufacture, by hand, of checked cotton goods. He himself received his education, partly in private schools, in his native country, and partly in the public schools, in places where his father resided. At the age of ten years, he was placed in the factory of Joseph Flemming, of Fairmount, where he worked as a cotton picker. He afterwards went to learn the weaving business, with Isaac Rowe, but, subsequently, accompanied his father to Manayunk where the whole family found employment in the mill of Joseph Ripka. He continued thus, with some slight intermissions, from 1850 to 1860, when he occupied the position of power loom boss. At the outbreak of the war, he entered the 23d Pennsylvania regiment, serving till near the close of the Peninsular campaign, when illness obliged him to enter the army hospital. After some desultory occupation, he enlisted in the navy, about nine months previous to the close of the war; by that means recovering his health. After this, he was variously employed till he finally entered the insurance office of his future partner, as clerk, remaining in that position till 1866, when the partnership above mentioned was formed. He was indefatigable in endeavoring to improve his education, by attending night-school and commercial colleges, obtaining, in this way, a thorough knowledge of business. He was married, in October, 1871, to Annie, daughter of James Wallace, of Philadelphia, by whom he has had one child.

WILLIAM ARROTT, the financial partner of the concern, was born in the North of Ireland, October 10th, 1830. At an early age he was placed at school, and applied himself diligently to the acquisition of a sound English education. At fifteen, he entered a Government survey office, where he saw active service for two years. He next became a school teacher and, in 1851, emigrated to the United States, arriving in Philadelphia in August of that year. In this country, he followed various occupations, till 1859, when he entered the insurance office of William Getty, with whom he re-

Robert J. Woods


JAMES DOAK JR & Co
STANDARD CARPET MILLS
OFFICE
JAMES DOAK JR & Co
CARPETS

mained for five years, when he was admitted as a partner, and, in 1865, purchased the sole interest of the business, which he has since conducted with remarkable success. In 1853, he was married, for the first time, to Anna Wallace, who, however, died some two years later. His second marriage took place in May, 1857, to Agnes Young, by whom he has had four children, all living.

HORATIO G. KERN, Manufacturer of Surgical and Dental Instruments, Philadelphia, commenced business for himself in a very small way, in the spring of 1837, on a capital which he had amassed by his overwork at nights, during his apprenticeship to Wiegand & Snowden. On starting, he possessed but $200 in all, and commenced operations at premises situated in Filbert below Eighth street. At the very outset of his career, he narrowly escaped total ruin, as the terrible financial crisis of 1837 burst upon the country very soon after he had opened his shop. He would have been obliged to succumb to its violence, had he not fortunately received an order from Samuel Sheppard for a few gross of Chase's Trusses, which enabled him to weather the storm and wait patiently for better times. During the first year, his business was very small; and, with a view of increasing it, he removed, in the second year, to a shop in the basement of Carpenter's buildings, on Eighth above Market street. Here he struggled with painful perseverance for five years, barely making more than his expenses. But his assiduity and diligent application to business were at length rewarded, as, during this time, he was gradually gaining a reputation which eventually led to a great increase in his trade. His business grew from year to year, until it became so large that the premises he occupied were found too contracted for his purposes, and he accordingly removed to Market below Eighth street. Business still continuing to expand, he decided to purchase the property at No. 21 North Sixth street, where he established himself, and still remains. His business still enlarged itself with the increasing growth of the city, notwithstanding that he had to contend with numerous competitors, who had been longer established than himself, and with newcomers, who rose up around him, until its present large proportions were reached. It now stands among the principal manufactories of surgical and dental instruments in the country. He attributes his well-merited success to his steady industry and constant attention to his business, and also, in a great measure, to frugality in his mode of living.

He was born at Hill Town, Bucks county, Pennsylvania, and received a limited education in Philadelphia. After completing his studies, he was apprenticed to Wiegand & Snowden, and served with them for six years, when he commenced his present business. He was married in Philadelphia.

JAMES G. & WILLIAM K. SALTER, Manufacturers of Mirrors and Picture Frames, commenced their business in 1861, with a nominal capital of only a few dollars, in a small second story room on Arch street, Philadelphia. The rent they then paid was $96 a year, and their annual sales did not exceed $5000. Very slowly, but surely, they worked their way along till they were enabled to occupy more capacious premises, on Sixth north of Arch street. They remained there for two years, the business quadrupling itself every year, till another removal was required by their growing trade. They therefore established themselves in Market street above Eighth, where their trade rapidly developed itself, till it extended to the principal cities of the South and West. In 1871, the senior partner determined to establish a retail store, and, for this purpose, secured premises at No. 911 Market street, which afforded ample facilities for carrying on the manufacture with both the wholesale and retail branches of the business. The junior partner acts as the travelling agent of the firm, visiting, semi-annually, the chief towns in this and other States, while the senior remains at home, personally superintending the manufacture and details of the business; and to his intimate knowledge of the trade, and the care he exercises in sending out nothing but superior goods, may be attributed much of the success enjoyed by the firm. The present rental paid for the store is $4000 a year, and the annual sales amount to $150,000.

JAMES G. SALTER was born in England, and, after receiving a fair education, entered as clerk the counting house of his father, who was engaged in the dry goods business. At the age of twenty, he obtained a position in the large dry goods house of Pim Brothers & Co., where he rose rapidly, and, at the age of twenty-four, had attained an important position, having charge of one of the branches of the business. He, however, gave up this position, being desirous of entering into business on

his own account, and, at the age of twenty-five, emigrated to the United States. On arriving here, his first step was to seek the best field for his abilities; and, after mature deliberation, he decided upon that in which he is now engaged. He placed himself under the instructions of a first-class practical mechanic, and rapidly mastered all the details of the trade. That accomplished, he started as salesman on his own account, buying his goods from his employer, and realizing handsome profits. In this way he saved money, which he expended in experiments on some new processes in the business, and when he finally determined to commence manufacturing, in connection with his brother, he had but a few dollars left. The results of this partnership are already known. He was married, in 1866, to Mary, daughter of Samuel Milliken, merchant, of Philadelphia.

NATHANIEL FERGUSON, Robesonia, Berks county, Iron Manufacturer, was born in Lancaster county, November 20th, 1817. His father, John Ferguson, came to the United States in the early part of this century, and died at the advanced age of ninety years. His mother is still living, and in her one hundred and second year. He was educated at the common school and the Moscow Academy, being fitted at the age of eighteen to commence teaching. After pursuing that calling for eighteen months, he became clerk, in 1839, at the Elizabeth Charcoal Furnace, Lancaster county, established by the well-known Robert Coleman. There he obtained his first knowledge of iron manufacture, and remained for nine and a half years, acting during the last seven years as manager for the heirs of James Coleman. He then became a partner in the firm of Eckert, Gilbert & Co., of Swatara Furnace, Schuylkill county, as practical manager of the works. The capacity of the furnace was about forty tons, and the number of hands employed from forty to fifty. When anthracite iron began to take a hold on the market, it was found unprofitable, on account of the high price of wood, to continue the manufacture of charcoal iron; and, as the furnace was not convenient to this anthracite region, it was decided to close it, and the firm was dissolved in 1855. In 1857, he became manager of the iron works at Robesonia, having failed to negotiate satisfactorily for a partnership; but, on the death of Mr. Robeson, which occurred in 1860, he purchased an interest in the concern, forming a partnership with Mr. White, with the style of White, Ferguson & Co., the interest of the late proprietor being represented by the anonymous partner. That interest expired in 1853, and the name of the firm was changed to White & Ferguson. The former dying in 1868, left his partner sole proprietor of the works, chargeable, however, with the interest in the business belonging to the heirs of Mr. White. Since 1858, two furnaces have been in blast, as needed, the quality of iron manufactured being red short iron, similar to what is usually produced from the Cornwall ore. This species of iron was worth (about 1860–'61) from $15 to $18 a ton. The works are now capable of producing from 175 to 200 tons, and employ on an average about seventy-five hands. They are provided with a branch track, which carries the iron to the main line of the Lebanon Valley Railroad, distant about half a mile, whence it is distributed to the different markets. These are chiefly found in Reading and Philadelphia, and occasionally Pittsburgh. He has been a very successful business man, and truly the architect of his own fortune, as he commenced with no capital except fifty cents, which his mother gave him when he became a school teacher. He is remarkable for shrewdness, tact and sound judgment, and his abilities, naturally above the ordinary level, have been improved and extended by experience and travel, particularly in the West, where he has travelled considerably, prospecting and making investments. During the war, he was a firm supporter of the Union cause, and contributed largely to sustain it. His position and standing as a business man are well known throughout the State, and his reputation for hospitality and benevolence has spread for miles around his home. He is a gentleman of the old school, of agreeable presence and courteous manners, and his universal kindness to all standing in need of assistance has won for him the love and respect of the community. He was married in 1856, to Amanda Davenport, of Berks county, and has children growing up.

THE PARK BREWERY, of Reading, owned and conducted by Frederick Lauer, was erected in 1866, and is used solely for the production of lager beer. The proprietor is also the owner of the brewery at the corner of Third and Chestnut streets, in the same city, and it was on this spot that he commenced the business, as long ago as the spring of 1826. At that early period, an old log house, in the middle of a wretched swamp, was changed into a brewery by his father, and there he, as foreman and clerk, superintended the business in its en-

Nath.l Ferguson

GALAXY PUB CO PHILA

Lauer's Ale & Porter Brewery, No 1. Reading, Pa

tirety. At this time he had not attained the age of sixteen years. He was wont to rise each day at two A. M., and until daylight he was employed, aided by one assistant, in accomplishing the brewing. After breakfast, by means of a one-horse conveyance, he distributed the beer to the various customers. During the afternoon and evening hours, he attended in the saloon attached to the brewery, where malt liquors were dispensed by retail, and then retired to a rest not exceeding three hours. The original capacity of the brewery was but five barrels per day; in two months' time this amount was doubled, and increased thereafter greatly. For five years only what was called at that time strong beer was produced: in 1831, ale and porter were added to the manufacture. To these lager beer succeeded in 1844. In 1835, he became the proprietor of the establishment; he then enlarged the building, employed more assistants and extended the business. As was remarked before, the original brewery was situated in a swamp; he filled this up gradually, and it is now one of the best locations, covered with handsome trees and houses, beside his large brewery and private residence. In 1849, he commenced to purchase vacant lots on North Third street, beyond Walnut, of different parties, and quarried extensive vaults there in the solid limestone rock for the storage of beer. In 1854, in the same locality, he commenced the boring of an artesian well, the work of which was suspended in 1860, after penetrating a depth of 2000 feet, at a cost of $22,000. In 1866, he erected on this site a large brewery, five stories high, containing the latest improvements, and complete in every respect. This and the one at Third and Chestnut streets are in steady operation, and employ from thirty-five to forty hands, making upwards of 20,000 barrels of malt liquors per annum. If necessary, this capacity can be doubled. Connected with the Park Brewery, and from which it receives its name, is a fine park of seven acres, purchased in 1849, and laid out in a highly ornamental style, planted with silver poplar and other shade trees. In it stands a fine house, fitted up with porticoes and other conveniences, all calculated to minister to the pleasure of visitors. The owner was always in favor of public parks, and has advocated their establishment in all large towns and cities, for the discoursing of good music and the sale of malt liquors and domestic wines.

He wields a great and commanding influence among the brewers of the country, and has an extensive acquaintance in Europe. In 1862, the brewers of the United States formed an association for mutual protection and the advancement of their interests; in the first and subsequent five annual sessions of this "Brewers' Congress," he was chosen presiding officer. Since that period, he has been the honorary president. He discharged his trust so successfully that, at the session held in Milwaukee, in 1864, he was the recipient of a silver tea service and gold-headed cane of the value of $1800. In 1865, he was appointed one of three commissioners to visit Europe, for the purpose of ascertaining what the experience of other countries had demonstrated to be just and equitable in the taxation of malt liquors. The commissioners were on a tour for three months, through the British Dominions, Belgium, the present German Empire, Switzerland and France, and the result was embodied in a very interesting, able and exhaustive report made to the United States Revenue Commission. These visiting commissioners were named by the Brewers' Congress, and duly authorized by the Secretary of the Treasury, Mr. McCulloch; and it may be added, that the report so submitted was the means of preventing a largely increased tax on malt liquors. While he was President of the Brewers' Congress, he was *ex-officio* Chairman of the Committee of Agitation, whose duty it was to look after the interests of the trade whenever anything relating to their business came up for discussion in Congress at Washington. In the winter of 1863, when barley and hops were advancing in price, this committee visited Washington and asked the Committee of Ways and Means to afford them relief until the brewers had agreed upon new prices for their malt liquors, to correspond with the high rates of barley and hops, as they were still using the old scale of prices. This had the effect of reducing the tax from one dollar to sixty cents, and retaining it at that figure for thirteen months. In 1864, the Senate Finance Committee recommended an increase of tax. The President of the Brewers' Congress, on hearing of this, telegraphed to prominent brewers of Philadelphia and New York to meet him in Washington; and just as the Senate was assembling, the committee was hastily summoned, and in ten minutes' time the matter was explained. By this action, the proposed increase was prevented. Later, in the same session, a movement was made in the House to the same end. The Brewers' Committee thereupon submitted a statement, showing the distinction made by European governments in the taxation of spirituous or distilled liquors, and those only fermented. The result was, a temporary abandonment of the proposed increase, which, however, at a still later period, assumed another shape, in the determination of the House to add an increased amount of

fifty cents per barrel. The Chairman of the Committee of Agitation thereupon summoned the nearest members of the committee to meet him at Washington. The bill had already passed the first reading in the House, and the Committee of Ways and Means refused to make any change therein. Subsequently, by his own unaided exertions (after the nine members who had responded to his summons had given up all hope and action in the matter), on calling on various influential and leading members of the House, he had the bill so far modified as to leave the Malt Liquor Tax unchanged; this passed in Committee of the Whole by a majority of five, and in its final passage by a majority of four. Owing to the confusion in the law relating to the brewing business, many brewers were victimized by unscrupulous detectives; but, through the exertions of the Chairman of the Committee on Agitation, aided by Hon. J. Glancy Jones, of Reading, and John J. Freedman, of New York, who visited Secretary McCulloch and Commissioner Rollins, the brewers in question were released at once. In January, 1868, accompanied by J. J. Freedman, attorney for the Brewers' Association, he visited Washington, and had an interview with Special Commissioner Wells, to point out the obnoxious parts in the existing Revenue Laws, praying for relief in relation to the per centage on stamps, and showing cause why the duty on Canadian barley should be reduced to five cents. The Brewers' Committee was summoned, and explained the matter fully to the Committee of Ways and Means; they then left for home, deeming their errand had been effectual in convincing the committee, and that the proposed relief would be granted. But, on the following April 29th, the chairman received a confidential despatch that the Committee of Ways and Means was about reporting without removing the objectionable articles, and it was necessary for the brewers to be on the alert. By his incessant, unwearied and appropriate action, relief was ultimately obtained.

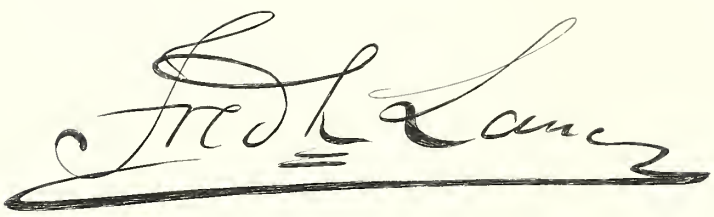
In 1867, when the price of hops rose to seventy cents per pound, he wrote to some of the principal hop merchants in Europe, informing them of the fact, and advising them to send hops to this country as an article of commerce, which was immediately done, and it had the effect of reducing the price one-half. One year thereafter, when the price of malt and barley advanced fifty per cent., or to nearly three dollars per bushel, a similar suggestion to the importers of New York had the effect of bringing nearly 2,000,000 bushels of foreign barley and malt to this country, whereupon the price was reduced to a reasonable figure.

So far the efforts of the brewers have failed in obtaining any modification of the existing Revenue Laws on their products, but he expects that in the new Congress, which met in December of the present year (1873), something will be done for their relief.

FREDERICK LAUER is a native of the *ci-devant* Province of Palatine, now Rhenish Bavaria, where he was born, October 14th, 1810. Before he was thirteen years of age, he embarked, with his father and the family, for the United States, and arrived in Reading *via* Baltimore. For the first four months after reaching Pennsylvania, he was engaged in the humble duty of a butcher boy. Thence he repaired to Womelsdorf, in Berks county, where his father had started a small brewery, and where he worked for two years, familiarizing himself with all the details of the operation. In 1826, as already stated, he returned to Reading, and took charge of the brewery which his father established there, and where he has since continued for nearly half a century.

PHŒNIX POTTERY WORKS, Phœnixville, Chester county, Schreiber & Co., Proprietors, was founded in 1867, by W. A. Schreiber, with the style of Phœnix Pottery and Fire Brick Company. It organized under the general manufacturing laws of the State, with an original capital of $8000, afterwards increased to $43,600, paid in. The first officers were, G. H. Sellers, President, Joseph B. McAllister, Treasurer, and W. A. Schreiber, Secretary and General Superintendent, the latter having almost the exclusive management of the works. In 1869, on G. H. Sellers leaving the town, Samuel J. Reeves was elected in his stead. Constant dissensions among the stockholders induced the founder to threaten the abandonment of the affair; but he subsequently succeeded in leasing the factory from the company, and is now carrying it on under the name of Schreiber & Co., he being general partner, and John F. Betz, of Philadelphia, special partner. The products of the manufactory are parian, stone bisque, stone china, c. c., black, mazarine, lava, Rockingham, white-lined, fire-proof and fancy ware, it being the only one in the United States where the white-lined article is manufactured. The works were commenced on a very small scale, employing about twelve hands; but the annual manufacture has now reached $75,000, necessitating the employment of about sixty hands. The business extends

Lawrie's Mill, Lyle's Ford, Glenwhilly, Loch Ryan in the distance.



to all parts of the United States, California included; also to the provinces of Canada, New Brunswick, etc., sales being only effected to jobbers.

W. A. SCHREIBER was born in Germany, August 11th, 1837, and was brought up in a mercantile house in Frankfort on the Main. In July, 1856, he came to this country, and immediately went to Phœnixville, where he entered the store of Reeves & Cornet, with whom he remained four years, studying the manners and language of the country. He then started a store (without capital) on his own account, becoming agent for some express and steamship companies and foreign exchange houses. While thus engaged, he discovered deposits of kaolin, or China clay, in the neighborhood, and, being acquainted with its properties, determined to commence the manufacture of pottery. He had to encounter and overcome many obstacles before raising the business to its present condition; but, by ingenuity and determination, he has succeeded in successfully establishing an industry which had hitherto proved a comparative failure in the United States. He produces nothing but the finest goods, and is laboring for a name and reputation, rather than for gain, his efforts being directed towards elevating the business to a high standard of art manufacture. He superintends the whole concern, even to the sale of the goods. He has now in preparation a plan for a national pottery, based upon the systems of Europe, and has so far secured the cooperation of many members of Congress, with other influential men, that they are willing to appoint him special commissioner to visit Europe and report upon the methods there employed. He is also engaged upon a *History of the Ceramic Manufactures of the World*, on which he has already spent two years of labor, and, doubtless, his indomitable energy and capability for the work will bring it, as well as his plan for the establishment of a national porcelain manufactory, to a successful issue.

GEORGE WASHINGTON LORD, Practical Engineer and Manufacturer of Steam Boiler Cleansing Compound, Philadelphia, was born, January 2d, 1834, in Montgomery county, Pennsylvania, and received his education at Pottstown till attaining the age of fourteen. As a boy, he had a liking for machinery, and this taste he gratified by entering the Reading workshops of the Philadelphia & Reading Railroad Company. In this company he served seven years. On leaving their employ he went to the West Indies, and worked for a salt manufacturing company at West Cankes Island. After spending about a year there he returned to this country, and pursued the occupation of locomotive driving for several years in the Southern States. At the breaking out of the war, he joined the 5th Pennsylvania Cavalry, in which regiment he served three years, and afterwards was employed in running a locomotive for the Government, in Tennessee. Then he returned to Philadelphia, and was for five years employed in driving the machinery of a steam brick establishment. During this time, and previously, he had been much impressed with the difficulty which existed in preventing the formation of scale in boilers. Accordingly, he gave a great deal of time and attention to the subject; and, after much study and many experiments, succeeded in producing a compound the use of which should not only prevent the formation of scale, but destroy that already formed, even though of many years' growth. After the invention was made and perfected, he experienced much difficulty in obtaining a patent; but this was at length procured in December, 1869. George W. Lord did not, though, at once relinquish his position; but, after working hours, employed himself in putting up small parcels of his compound, which he distributed gratis to employers of steam power. By its own merits the article gradually worked its way into favor; and before long the proprietor devoted himself wholly to its manufacture, occupying the premises where he is still located, No. 232 Arch street. This compound differs from many similar preparations by not being in any way injurious to iron. As a proof of this, the proprietor, in March, 1871, put up for distribution 10,000 bottles of the compound in a liquid state, with bright iron turnings and some very fine wire. The liquid is now as clear as when first put up, and the iron as bright. At first, the powder was sold at thirty-five cents per pound; but in time, as the manufacturer gained experience in buying his chemicals, he was able to reduce the price, and now it is only ten cents per pound, and the compound is used throughout the country. The proprietor may already be classed among the self-made men of the day; and as he is still young, great things may be predicted for his future. The sales during the past year amounted to $10,000, and this year he expects to see that amount doubled. Some of his eminently practical ideas upon mechanical subjects, with which he is familiar, he has given to the public through the medium of the press.

KEEN & COATES TANNERY.—This extensive concern, commonly known by this name, though exclusively operated by the firm of Abraham Coates & Son, was established on its present basis in 1863, by the purchase of the site it occupies and the construction of the vats, tanks and other appliances in use at a cost of $65,000. It is situated at No. 943 North Front street, Philadelphia. The ground occupied has a frontage of 150 feet, extending back to a depth of 450 feet, while adjoining this is a leased lot and additional buildings, belonging to the Keen estate. The yard contains about 300 vats, and is otherwise occupied by various buildings used in the manufacture, such as offices, stables, sheds for the storage of bark, etc. The annual consumption of this latter article is upwards of 2000 cords, obtained chiefly from Pennsylvania and Delaware, and the yearly product of the tannery exceeds 20,000 sides of sole leather, having the unusual average weight of twenty pounds to the side. Till recently, the firm has been in the habit of sending a large amount of hides to country yards—some five or six in number—to be tanned, the quantity of leather thus produced nearly equalling the manufacture of their own establishment. The raw material used is selected with great care, and mainly obtained from the city butchers. The time required in the process of tanning is usually from ten to twelve months, but sometimes exceeds that period. The greatest care is constantly employed throughout the manufacture, in order to produce a high and uniform grade of leather, and has resulted in the establishment of a widespread and favorable reputation in the markets of Philadelphia, New York and Boston, the latter city receiving the major portion of the leather manufactured, stamped with the trade mark, "Keen & Coates," a brand favorably known throughout the country for more than forty years. The tannery is constructed on the most approved principles, and supplied with the newest machinery, all propelled by steam power. Among the peculiar appliances in use may be mentioned a valuable rolling apparatus—the invention of the junior partner, James S. Coates. It consists of two rollers, with a double crank motion, so arranged as to prevent the vibration, so annoying and troublesome in the ordinary roller. From the figures given above, it will be seen that this concern transacts a very extensive business. Its chief is the oldest living representative of the trade in the city.

ABRAHAM COATES was born in Philadelphia, April 1st, 1804. He is the eldest son of Isaac Coates, a ship carpenter (of English origin), and of Rebecca Norris, belonging to a prominent Quaker family in the city. He obtained a fair English education, in private schools, and, at the age of sixteen, began to learn the trade of house carpenter, but shortly abandoned it to learn that of tanning. In 1821, he entered the employ of Thomas & Benjamin Williams, tanners, at Front and Poplar streets. He remained with them till 1823, when they failed, and he finished his time with Whiteman & McCann, on Second street north of Laurel, staying with them for two years. In 1826, he formed a partnership with James Styles, and carried on the business, on Laurel street, for three years. In 1829, he entered into partnership with John B. Keen, who, some twelve years previously, had established a tannery on the lot before mentioned, as adjoining the present yards of the firm. Here the business was carried on, with growing prosperity, for a period of twenty-five years, and during that time he was married (October 13th, 1836) to Anna S. Keen, his partner's eldest daughter. In 1854, the death of John B. Keen occurred. By a provision of his will, he directed that the partnership should be continued, for the benefit of his heirs, for a period of ten years; but, on the majority of his youngest child (1860), this proviso was set aside by mutual agreement, and the partnership dissolved. The present firm was organized in 1863, by the admission of James S. Coates, son of the proprietor, and J. S. Keen, son of his former partner. The new concern immediately went into operation, but the style of the firm remained unchanged. Since then the business has been continued with increasing success, and additions made from time to time to the buildings and apparatus, as trade required, and, in 1866, the interest of the former partner was purchased by the firm. Throughout his entire career, the senior partner has studiously avoided active participation in politics. He has been for upwards of forty years a prominent member of the Masonic body. United with his great business ability and industry, he has constantly shown himself liberal and benevolent in his private character.

JAMES S. COATES was born in Philadelphia, August 1st, 1839, and received a liberal English education in private schools of that city. He was married October 6th, 1864, to Annie, daughter of Hon. William Audenried, of Schuylkill county, Pennsylvania. He is a man of excellent business qualifications, and since his admission to partnership with his father has taken a large share in the management of the tannery.

Abraham Coates

THE NORRIS OIL WORKS, Bridgeport.—This establishment is the result of the dissolution of a partnership previously existing between the proprietor, Dr. Henry Theodore Slemmer, and the other members of the concern, known as the Montgomery Oil Works. In 1866, he erected the present works, in the borough of Bridgeport, on the Schuylkill river, opposite Norristown, Pennsylvania. They are commodious, and the plan of their arrangement admirably suited to the requirements of the manufacture. The engine is of thirty horse power, but can be worked up to nearly double that force. The still in use has a capacity of 100 barrels, and now produces about 300 barrels a week. The tanks for storing the oil are capable of containing vast quantities, one of them alone holding 1600 barrels. The factory has great facilities for business, as it is situated with a canal on one side and a railway on the other, with a siding running into its interior. At first, the crude oil was received in barrels, but is now forwarded in tank cars, containing from eighty to ninety barrels. These cars, being introduced into the works, can be emptied with little or no trouble, the oil being readily drawn off into the receiving tanks. The different articles manufactured in this factory are, axle oil, car oil, head-light oil, benzine, gasoline, paraffine, etc.; but the specialty, upon which the reputation of the works rests, is called the "Double refined lubricating oil." This oil is known to most machinists, and has been pronounced superior to all other lubricating oils, whether animal or vegetable. Its fire test is about 400 Fahrenheit. A superior illuminating oil is also manufactured at the works, with a fire test of from 140 to 180 degrees, and a specific gravity of 45 degrees. The arrangement and designs of the machinery, etc., are due to the proprietor, who personally inspects the manufacture.

HENRY THEODORE SLEMMER was born in Hanover township, Montgomery county, Pennsylvania, June 1st, 1822. His father was editor of the *Norristown Register* and member of the State Legislature. After spending about one year in his father's printing office, he entered the general store of William Richards, of Norristown. At the age of fifteen years, he went to Philadelphia, where he was apprenticed to N. B. Leidy, in the drug and chemical business. At the expiration of his time, he studied medicine under William Corson, of Norristown. He entered the Medical Department of the University of Pennsylvania, where he graduated with honor, March 31st, 1843. He then practised his profession for a short time in Philadelphia and Upper Salford township, finally opening a drug store in Norristown, in August, 1844. In 1859, he began experimenting upon Seneca oil as an illuminator, with much success; but, upon the discovery of petroleum in the State, turned his attention to that article. The results led to his erecting (in 1860) a small still for further experiments, which so encouraged him that, in the following year, he built a larger still, from which he produced an illuminating oil, a lubricator and a residuum, all proving highly profitable. He then bought a lot of ground, below Ford street, and put up a factory, with the requisite machinery, which he worked under the name of the Montgomery Oil Works, and, in 1862, entered into partnership with his three brothers, for prosecuting the business. This partnership lasted till 1866, with a profitable business, when it was dissolved. During that time he was experimenting for the production of his lubricator; he succeeded in 1865, and in February, 1866, a patent was granted him by the United States for its manufacture.

FINWOOD MILLS, David Trainer & Sons, Proprietors, are located on the Philadelphia, Wilmington & Baltimore Railroad, about three miles south of Chester. The old deeds indicate that between 1750 and 1760, and certainly before 1753, a flouring mill was erected on a portion of the present site of mill No. 1, by John Price, then the owner of the estate, which, in 1806, was purchased by David Trainer, the father of the senior member of the present firm. During the war of 1812, the property was occupied by the United States troops, and they were reviewed by General Anthony Wayne. A saw mill was added in 1812, and the two were successfully operated until 1837, when an addition, 80 by 40 feet and two and a half stories high, was made to the old flouring mill; and the whole having been fitted with machinery, was put into operation for the manufacture of cotton goods, by the present head of the firm, in partnership with John Hastings, Jr. By the failure of their commission merchant, in 1842, they were deeply involved, and the partnership having been dissolved, David Trainer resolved to retrieve his fortunes single handed. His father having died on March 1st, 1849, he inherited the estate, including some 150 acres of land, and continued a successful career until October 8th, 1851, when the old mill was entirely destroyed by fire, and the portion erected in 1837 badly damaged. Immediate steps were taken for the rebuilding of the mills, and by August 1st, 1852, the old

flouring mill had been replaced by a new structure, 110 by 50 feet, and three and a half stories high, the whole entirely refitted with new machinery. Operations were then resumed. In 1865, an addition of 90 feet was made to the large mill, giving a main building 200 by 50 feet, three and a half stories, with the attached mill erected in 1837, used as a cloth and picker house, a dye and finishing house, 80 by 40 feet, two stories, an engine house, 50 by 40 feet, etc. This establishment contains 150 looms, four self-acting mules, with 2600 spindles, twenty-two Whitin spinning frames, with 4000 spindles, thirty-one self-stripping cards, two Whitin lappers, six Providence Machine Company's spreaders, five warping machines, a patent spooler with 600 spindles, and three beaming frames. The motive power is derived from a Corliss engine of 150 horse power, driven by three Dimpfel boilers, requiring a consumption of three tons of coal per day. This mill employs 120 hands, consumes 514,800 pounds of cotton per annum, and produces 1,130,000 yards of bed ticking and shirting stripes; also 429,000 pounds of No. 18 yarn. John Newlin Trainer having attained his majority in 1865, was admitted to partnership with his father, under the firm name of D. Trainer & Son. William E. Trainer was admitted, and the firm, which has since been increased by the entrance of Edward Trainer, assumed its present style on January 1st, 1868. In 1869, mill No. 2, 60 by 202 feet, two stories, with boiler house, 20 by 60 feet, and carpenter's shop, 15 by 55 feet, was erected, and, having been filled with the best machinery, was put into operation in April, 1870. It contains eight spreaders, fifty-two cards and forty-six spinning frames, with 8800 spindles, run by a 200 horse Corliss engine, connected with four Babcock & Wilcox boilers. It employs eighty hands, consumes 216,000 pounds of cotton per annum, and turns out 180,000 pounds of No. 40 yarn. Mill No. 3, located about half a mile from the other mills, was erected by the Chester Improvement Company, in 1872 and 1873. It is 60 by 238 feet, two stories, with engine and boiler houses, and eighteen tenant houses; it was filled with the most approved machinery and put into operation by D. Trainer & Sons, who had leased it for nine years, in October, 1873. It contains nine spreaders, fifty-four spinning frames, with 10,368 spindles, driven by a 200 horse Corliss engine, to which steam is supplied by Babcock & Wilcox's patent boilers of 225 horse power. It employs about 100 hands, consumes 180,000 pounds of cotton, and turns out 150,000 pounds of fine yarns, Nos. 40, 50 and 60, per annum. The firm employs altogether 300 hands, at an expense of about $125,000 per annum; consumes a total of 2000 bales of cotton, and produces 759,000 pounds of yarns and 1,130,000 yards of cotton cloth per annum. Their mills are models of admirable and systematic arrangement, and each department is under the supervision of a skilful and experienced head. There are, besides three mansion houses, fifty-five houses in addition to those of the Chester Improvement Company, for the accommodation of operatives, where, as at the mills, every available provision is made for their welfare and comfort.

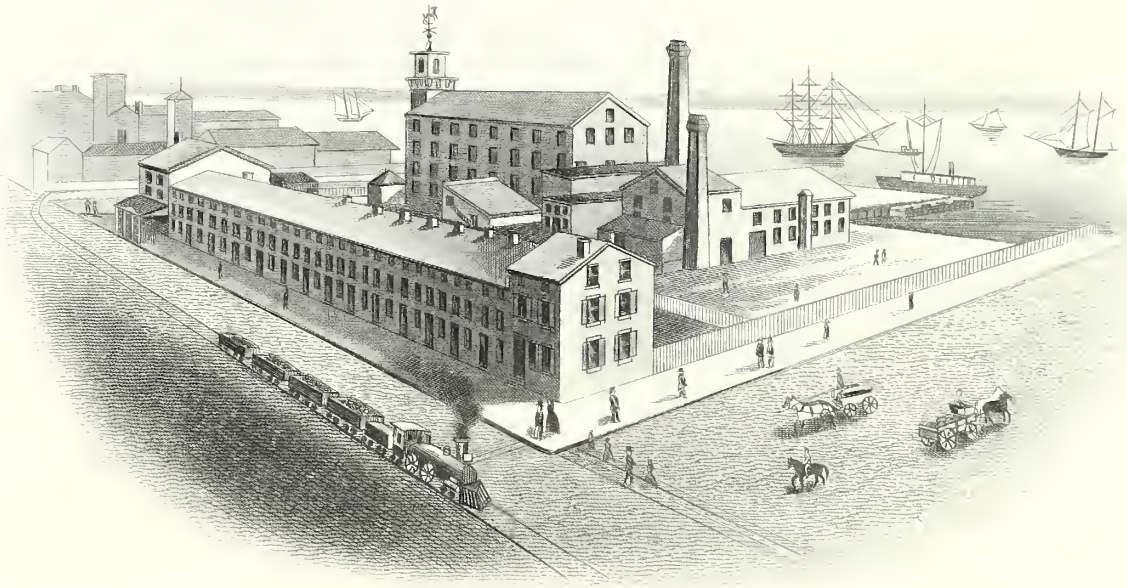
DAVID TRAINER was born where he now resides, July 9th, 1814, and, as he grew up on the farm, enjoyed such educational advantages as were afforded by the subscription schools of that period. He was occupied in agricultural pursuits and at the saw mill until 1837, when he embarked in the manufacturing business, which he has continued upon the same spot, triumphing over adversity and extending his capacity from time to time, so maintaining his rank among the representative establishments of Pennsylvania. He became connected with the Bank of Delaware County in 1833, and has been a director since it became a national institution, under the title of the Delaware County National Bank. He is public spirited and enterprising, and a warm supporter of public improvement. He has thoroughly educated his sons, and, having made them acquainted with the details of his business, gave to each an interest as he attained the proper age.

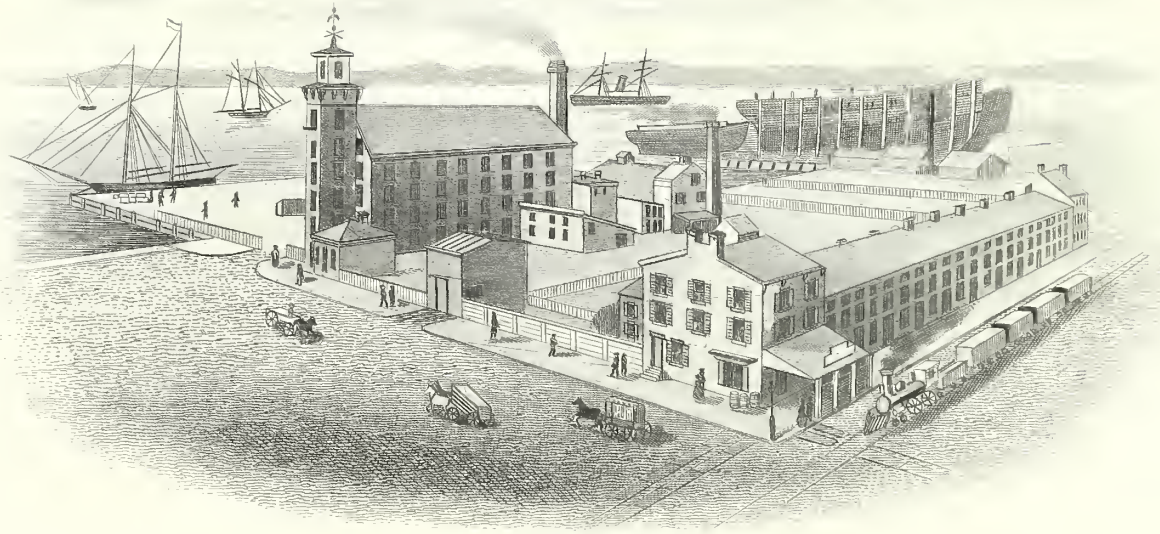
JOHN NEWLIN TRAINER was born September 4th, 1844, and, after attending the Friends' school, at Fifteenth and Race streets, Philadelphia, for some years, graduated at the Polytechnic College, and became a partner with his father. He is the purchasing agent and salesman for all the mills.

WILLIAM E. TRAINER was born January 20th, 1847, and, having been educated at the Friends' school in Philadelphia, mastered the practical details of manufacturing, and since his admission to the firm has been general superintendent of the mills.

EDWARD TRAINER was born November 27th, 1850, and, after a period spent in the Friends' school attended by his brothers, entered the Pennsylvania Military Academy. Since entering into the co-partnership he has had charge of the books of the firm.

David Haines





B. Gartside

James. Garfield

Amos Gartside

KEOKUK MILLS, Chester, B. Gartside & Sons, Proprietors.—This manufactory was founded in 1852, by the senior partner, Benjamin Gartside, and can claim the distinction of being the first factory built in that city. The original structure is 90 by 38 feet, four stories high. It was supplemented, in 1858–9, by the purchase of a property, with building thereon, from Samuel Cliff, and again, in 1860, by the erection of a large storehouse. The engine house, dye house, and drying house are connected with the end of the factory. The whole occupies an area of over two acres, comprising the square included between Front street and the Delaware river, and Parker and Fulton streets, and has a frontage of about 300 feet on the river, affording the firm peculiar facilities and advantages. There are four sets of woollen machinery with seventy-two looms, and the necessary appliances and finishing apparatus. The machinery used is the best that can be procured, and all the modern and best approved models have been introduced, with the most beneficial results, as to the quality of the goods manufactured. The motive power, which drives the whole, is an engine of sixty horse power. The establishment employs seventy-five hands and consumes over 3000 pounds of wool per week, and 1000 pounds of cotton warp, turning out 3000 yards of manufactured goods in that time. The goods produced are all wool Kentucky Jeans and Doeskins, and are of the finest quality. The wool used is all new, no shoddy being employed. Besides the above-mentioned buildings, twenty houses, for the accommodation of the operatives, have been provided, by the foresight of the firm. To meet the requirements of the business, a wharf was erected, in 1855, having a commodious frontage on the Delaware. Since the commencement, this business has progressed steadily till it has reached its present magnitude, now ranking among the most prosperous in the State. On January 1st, 1857, the two junior partners, James and Amos, were admitted into the concern, which, till then, had been carried on solely by the founder.

BENJAMIN GARTSIDE was born at Rochdale, England, May 26th, 1794. He was educated in his native country, where he learned the trade of hand-loom weaving and worked as journeyman, till 1831, when he emigrated to this country. He worked at his trade, at Blockley Mills, Philadelphia, till 1835, when he went to work for Joseph Ripka, at Manayunk, staying with him till 1838, when he began on his own account in a small way. He afterwards rented and fitted up a mill on the Wissahickon, which he operated till 1843, when he removed to Cardington, Delaware county, where he carried on the same business for nine years, till 1852, when he went to Chester and built the factory above described.

JAMES GARTSIDE was born in Lancashire, England, October 20th, 1823. He is the second son of the senior partner, and received but little education in his native country. He came, with his parents, to the United States, and obtained some further education at Blockley. He went into the mill there, at eight years of age, to learn piecing on throstles, and subsequently thoroughly mastered his business. He followed the fortunes of his father, in his various changes of residence, until he became a partner in the present concern. In 1863, he joined the army and served in the Gettysburg campaign. His rule through life has been a strict attention to his own affairs, and he has never meddled with other matters or sought positions, outside of his legitimate business.

AMOS GARTSIDE, the junior partner, was born in Lancashire, England, October 23, 1829. He was brought by his parents to this country, in 1831, and was educated in the common schools and in the Germantown Academy. At the age of eighteen, he entered his father's mill, where he practically learned his business and was admitted a partner as above mentioned. He has been prominent, as a public man, and honorably connected with most of the public and private institutions of benefit to the City of Chester and its surroundings.

ACHILLE LUCIEN ARCHAMBAULT, proprietor of the establishment known as the Kensington Iron Works, was born at Newtown, Bucks county, Pennsylvania, May 1st, 1822. His father, Joseph Archambault, was a soldier of Napoleon I. Born at Fontainebleau, he was educated under the eye of the Emperor, at the Polytechnic school, at Paris. He entered the army a year or so previously to the battle of Waterloo, in which he participated, as aide-de-camp to his patron, whose fortunes he followed to St. Helena, where he remained about three years. He was then removed to Madagascar, and thence to New York, where he learned the lamp and tinning business, which he afterwards established at Newtown, coupled with dentistry, being very successful in both. He purchased the hotel, and did much for the improvement of the

town. He was postmaster there, for several years; but, about 1838, sold his property and bought a farm, near Doylestown. There he farmed 100 acres and erected a saw-mill. He became captain of the Bucks and Montgomery county troop, and was instrumental in quelling the riots of 1844. He farmed for about three years, when he went to Philadelphia and engaged in the dry goods business, which he carried on till 1859, when he retired to private life. On the outbreak of the war, he raised the company called the Lafayette Guards, and afterwards one in the 2nd Pennsylvania Cavalry, of which he was elected major. He saw two years of active service, when he was compelled to retire, from injuries received. His son was educated at the village academy, at Newtown, and assisted his father in the Post-office and hotel. He worked and studied hard, and, afterwards, entered a country store, as clerk, staying there about two years. He then went with his father to the farm and, in the saw-mill apparently, first gained his taste for mechanics. Resolving to become a mechanic, he proceeded to Philadelphia, where he was apprenticed to Marshall & Brock. His time concluded, he worked with them and other parties till 1845, when he went to New Orleans and was engaged at the United States Mint, in that city. There he assisted in making the first press constructed there for coining silver dollars. On leaving the mint, he worked until summer, six months, for John Leeds & Co., who had the largest machine shop in the city. In the following fall, he returned and entered into partnership with a Mr. Jones for building steam engines and machinery, repairing fire engines, etc. In 1848, he again proceeded to Philadelphia, narrowly escaping the cholera. Soon after his arrival he purchased the machine establishment of Joel Bates, on Drinker's alley, where he continued the repairing of fire engines and the building of steam engines and other machinery. In 1849, while thus employed, he invented and constructed the Archambault Portable Fire Engine. It proved quite a success, and was placed on exhibition in various fairs, in Pennsylvania and other States, obtaining several medals and prizes. This engine is applicable to hoisting apparatus, for unloading vessels, to threshing machines, saw-mills, iron ore washers, and to many other purposes. In 1854, finding his premises too small, he bought property, at the corner of Fifteenth and Hamilton streets, where he erected suitable buildings and carried on his business prosperously. He, subsequently, added a boiler shop, and no boiler made in it has ever been known to burst. About 1861, he commenced the building of marine engines, and the success attending his first effort rapidly produced large orders. This decided him to secure more commodious premises, and he removed to Beach and Vienna streets, where he erected convenient and handsome buildings, and has, also, the convenience of a wharf, of 75 feet front by 400 feet in depth. During the oil excitement, he built many steam engines, sometimes three in a week, and has latterly undertaken the building of steam yachts. This is a very important branch of his business. He is the inventor of the small steam yacht, and has been remarkably successful in the construction of that class of vessel. The great prosperity of his business is entirely due to his own ability and industry as, at the age of twenty-two years, he was entirely without capital. He was married, in 1848, to Henrietta B., daughter of John Haupt, and sister of General Haupt, by whom he has four children. He has long been a prominent member of the order of Odd Fellows, and is a member of the Episcopalian Church.

THOMAS SHAFFER, Mechanical Engineer, was born in Westchester county, New York, May 22d, 1815. His father and paternal grandfather were both large manufacturers of paper. The latter emigrated from Germany to America prior to the Revolutionary War, and built and conducted the first paper mill in this country. It was located in what is now known as the Five Points, in New York city; and during the Revolution was designated by the Continental Congress as one of the two mills to furnish the Government with the paper used for printing the "Continental Currency." After the peace, the mill was removed to Spottswood, New Jersey, that place being selected for its excellent water-power. It was then a wild tract of Government land, but is now immensely valuable. By a series of misfortunes, including destruction of a will by interested parties, and the subsequent burning of the Capitol at Washington, which destroyed the Records of the Land Department (during the British invasion of 1814), the rightful owner of the property has been defrauded out of it, and the true heirs dispossessed. Thomas Shaffer was left an orphan at an early age, and had but spare educational advantages. Having to make his own way in the world, his first employment was as errand boy in a paper mill. When twelve years old, he entered the Ulster Iron Works, at Saugerties, New York, and, having become a general favorite with the employés and managers, he rapidly and thoroughly worked through all the branches of the trade, being afforded free access

A. L. Archambault

Thos. Shaffer

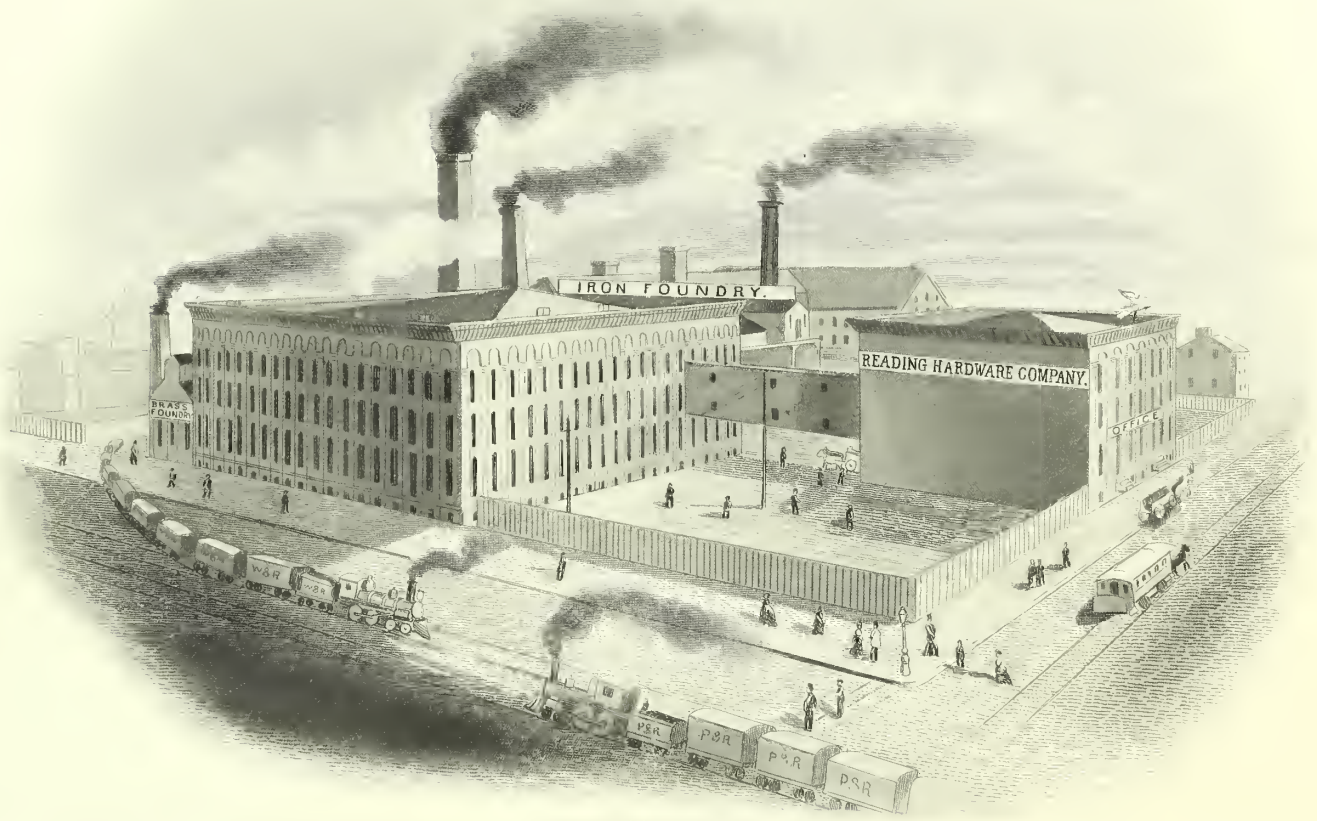
to all the departments of an establishment ranking the first in the country in the variety and excellence of its products. He was enabled, through the imported Staffordshire iron-worker, and also through the manager—who had acquired not only the skill of his native land, but had also been employed in France, and was perfectly acquainted with the foreign manufacture of iron—to gain a full and complete insight into all the manipulations of the craft, and the title of "a finished American workman." During the time he was employed at the Ulster Works, he operated the first successful furnace, in 1837, used for heating iron by means of anthracite coal. During the last years of his service here, he held the position of Workman Manager in charge of three trains of rolls, the highest station of a workman. His total connection with these works extended through eighteen years; he entered as a boy, and left as a thoroughly educated mechanic. In 1845, he became Master Workman of a rolling mill at Pompton, New Jersey, where he remained a year, and then passed to the works of Thomas Hunt, of Philadelphia, where he was employed in a similar capacity. After a year's sojourn, he was engaged at the Fairmount Iron Works, as Mill Manager and Master Workman. In 1850, he removed to Safe Harbor, Pennsylvania, and, as Superintendent, had charge of the rail and puddle mills of the iron works at that place for seven years, with entire satisfaction to the proprietors, who tendered him, on the eve of his departure therefrom, the most complimentary written testimonials of their appreciation of his great merits and superior qualifications. In 1856, he received the appointment of Mill Manager in the extensive works of the Phœnix Iron Company, which position he has occupied for the past eighteen years. Under his care, these works have kept in advance of all competitors—have grown to the vast dimensions they now occupy—and are known to-day as the most extensive and complete mills of the kind in the Union. All the practical experience and work requisite to put into successful operation the several valuable patents owned by this corporation have been furnished and performed by him, or under his direction. The Wrought Iron Chair, the Wrought Iron Cannon, known as the "Griffen Gun," the Wrought Iron Beams and Columns, all owe their successful manufacture to his untiring skill and industry. He is also an inventor of some note himself, having taken out a large number of patents, and allowed a still larger number of improvements to become public property. As the first of finished American workmen, he has been the educator of thousands, who may be found scattered through the works of the country, and all the skilled laborers employed by him have been brought up to their position under his supervision. He takes both pride and pleasure in imparting his varied and useful knowledge to others. He is emphatically a veteran in iron manufacture. For nearly half a century he has been engaged in it, and during this whole period has never been obliged to seek employment; all the responsible positions have sought him.

THE READING STOVE AND HOLLOW-WARE WORKS, trading under the style of Orr, Painter & Co., were established in 1866, the nine mechanics composing the firm entering into a co-partnership for the purpose in that year. They are Jesse Orr, Superintendent and General Manager, John R. Painter, Salesman, William M. Stauffer, Bookkeeper, Elijah Bull, Shipper, R. W. Nagle, Foreman of Foundry, William Grander, Foreman of Wareroom, and Jasper Sheeler, William H. Shick, and Henry C. Posey, engaged in the moulding department. The works were started at their present location, each member bringing into the concern an equal quota of capital, the total sum amounting to $27,000, all obtained by previous hard work and economy. All being practical men of business, and thoroughly acquainted with their trade and respective departments, they started with fair prospects, employing, at the beginning, fourteen hands, and turning out, during the first year, goods to the amount of $25,000. By perseverance and energy the business was steadily increased, year by year; and, as all the profits, accruing to the firm, were allowed to remain in the business, the capital was correspondingly augmented and, with it, their facilities for carrying on the growing trade, unembarrassed by want of means. Under these circumstances the transactions of the firm expanded till, at the present time, they employ a force of some ninety hands, and annually produce $225,000 worth of manufactures. The premises, occupied by them at Canal street below Chestnut, are extensive and convenient, covering an area of 246 by 112 feet, and supplied with all the necessary appliances for suitably prosecuting their business. All the partners, being practical men, have lent their personal aid and skill to the formation and enlargement of the business, which, with its proper distribution into distinct departments, each under the control of a head, especially suited to the branch he has charge of, is managed, perhaps, with

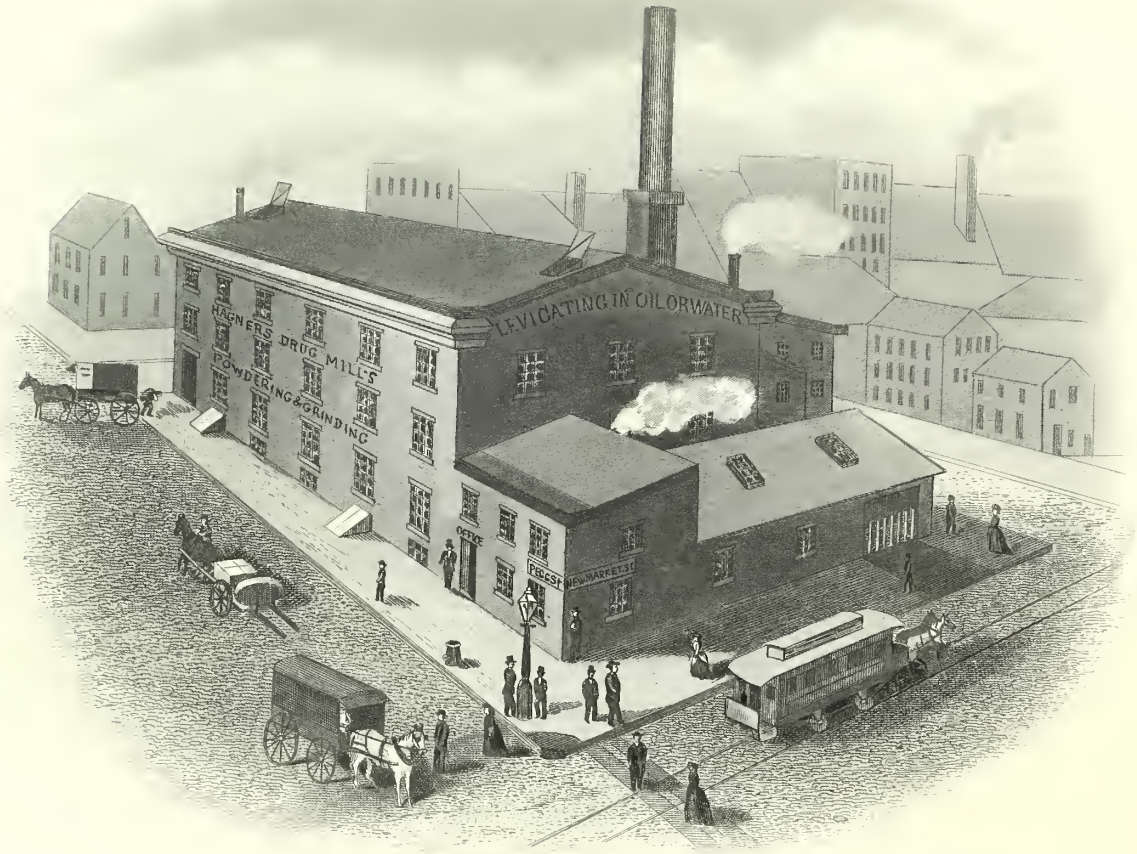
more individual ability than is usually to be met with in similar concerns, enabling the firm to manufacture goods, as nearly perfect as possible, and enhancing their reputation in the market.

JESSE ORR, the chief officer of the company, was born in Chester county, near Yellow Springs, in the year 1839. His parents were William and Margaret Orr, and natives of the same place. His early education was obtained at schools at, or in the neighborhood of his home, and subsequently completed at Freiland Seminary, Montgomery county, Pennsylvania. On leaving the seminary, he began to teach school in his native township, which occupation he followed for a time, and then entered into the general store business, continuing that till 1866, when he went to Reading with his partners, and commenced the works in which he is now engaged. In 1860, he was married to Anna Stitiler, a resident of Chester county, near his birthplace.

HAGNER'S DRUG MILLS, Philadelphia, were founded in 1812, by Charles V. Hagner, at the Falls of Schuylkill, being devoted exclusively to the powdering of drugs, and for performing the general mill work of the drug trade, water being the motive power. For many years previous, other members of the family had run these mills, manufacturing various articles, as flaxseed, barks, mustard, chocolate, grain, plaster, ores, etc. The chocolate manufactured and sold under the brand of "P. Hagner, Philadelphia," was well known and came into general use, immense quantities of the article being sent all over the country. In those early days, apothecaries powdered their own drugs with pestles and mortars, which varied in size from the capacity of a quart to the one holding five or six bushels; these were all worked by hand, and the process was necessarily slow and fatiguing. The idea of powdering and grinding drugs on an extensive scale and by machinery, was suggested to the founder of these mills by a business transaction with the well-known Dr. Haral, a prominent Philadelphia druggist of that day. The latter had several tons of cream of tartar, which the former offered to pulverize at two cents per pound, being about half the price it would have cost the owner had he employed the usual means by pestle and mortar. The terms, as proposed, were agreed upon, and the article in question was hauled from the doctor's warehouse, on Market street, to the Falls, in the evening. When Dr. Haral entered his office, on the following morning, he found the cream of tartar had been finished and returned. His amazement and indignation were unbounded. He declared it had been ruined; that it was perfectly impossible, in a single night, to effect that which would have occupied his men months to accomplish. A meeting of the principal druggists and other experts in that line was held at his office to consider the matter, and the cream of tartar was examined and tested in various ways: resulting in its being pronounced perfectly good, unusually white, and finer than any of them had seen before. The doctor was now well pleased, and, the affair becoming known, not only in Philadelphia, but also in New York, Boston, and other cities, the trade was completely revolutionized, and immense quantities of cream of tartar, Peruvian bark, ipecac, rhubarb, jalap, gentian, etc., etc., were sent to the mills from all parts. The proprietor then entered largely into the drug-milling business, and is its originator on this continent, and perhaps elsewhere. The trade increased to such an extent that, in 1820, he erected mills at Manayunk, and was one of the pioneers in building up that town. Nineteen years later, he came to Philadelphia, and obtained possession of the buildings and grounds of the Lancasterian College, on Pegg street, which he fitted up in a substantial manner, introducing powerful steam engines, and perfecting the various articles of machinery, after years of patient study and observation. Some of the apparatus he patented, but many of the processes are kept secret, being the result of long experience. These are very ingenious, particularly the mills used for the powdering of corrosive sublimate, arsenic, nux vomica, cantharides, euphorbium, podophyllin, opium, and assafœtida; also where gums are granulated to the various sizes required by the trade, and in those processes for grinding roots, barks, and herbs, for percolation, free from dust. He has also perfected machinery for grinding spices, myrrh, musk, cardamom seed, orris root, tonka, and vanilla beans, and various articles used for perfumery, without diminishing their strength or odor: also for crushing and bruising asbestos and other fibrous articles, without injury to the fibre. Curious machinery is used for levigating various articles, particularly paints, in oil or water, to the finest powder. The process which here obtains for pulverizing chocolate, skinning seeds, and also for dust-powdering opium, Peruvian bark, rhubarb, gamboge, coloeynth, aloes, and other costly gums and extracts to the finest impalpable powder, without injuring the article in any manner, is one of his earliest inventions. Slippery elm, licorice, quassia, rhatany,



Reading Hardware Co. Reading, Pennsylvania



MILL WORK OF ALL DESCRIPTIONS

VIEW

pareira brava, and other roots and barks are often required to be cut into pieces from the fourth of an inch to five or six inches in length, which is performed by powerful chipping machines; and upon some of them the surface is so arranged that it can be regulated to cut any size required, from the thirty-second part of an inch upward. The powdering of dye stuffs, such as indigo, cochineal, lac, turmeric, argols, Persian berries, etc., is a very important branch of drug milling, and special attention is given to this; and also to the grinding of hard crude substances, as manganese, corundum, emery, quartz, caustic soda, crucibles, etc. A new process is in use here for flaking plumbago and mica into exceedingly thin round leaves, of any given size; the demand for this kind of work has been very large of late years. Drugs, spices, etc., which have been damaged by fire or water, are often received at the mills. These require very careful and delicate handling to restore them. For this purpose, steam cleaners, brushes, dusters, and drying kilns are provided, the latter being heated to various degrees of temperature, according to the condition of the article. A number of specialties are now being introduced, namely: druggists' powdered maple charcoal, as a substitute for the high priced willow coal; granulated cork, as a packing and stuffing; manganese, foreign and domestic, of various tests; pure spices, and oil-expressed mustard; ground flaxseed; oat and malt meal; putty, and compound paints of great body; Nonpareil Fire Cement; Cedron Polishing Powder; American Cattle Medicine; Extract of Licorice Substitute; Fumigating Pastilles; dentifrices, and other articles of a similar nature, usually dealt in by druggists and pharmaceutists.

BALDERSTON, MARK, Carpenter and Builder, was born in Bucks county, Pennsylvania, December 26th, 1820. He is descended from a family who were among the earliest settlers of his native county; and his father, also named Mark Balderston, being a farmer, he spent his earlier years in agriculture, meanwhile enjoying fair educational advantages at the Fallsington school. In the spring of 1837, he became an apprentice to the carpenter's trade with George Dilks, in Philadelphia, where he proved industrious and active. After the expiration of his apprenticeship, he associated, on January 1st, 1842, in partnership with Jonathan Conover, who had been a journeyman with his instructor. After four years, this partnership was dissolved, and the business was carried on by Mark Balderston alone, until January 1st, 1858, when he associated with him Samuel M. Albertson, who had been his apprentice and journeyman, the firm assuming the style of Balderston & Albertson. The handsome works erected by the firm, in 1867, are located at 120 North Thirteenth street, occupying a front of 60 feet, and a depth of 115 feet. The buildings are two stories in height, with a beautiful front of pressed brick. They use steam power in their own business, but do no mill work for others. They contract for the erection and repair of offices, stores, factories, and private residences, many imposing and durable structures attesting their reliability and skill. He himself is a plain and unassuming man, but of sterling integrity, public spirited and benevolent. He has been for many years a manager of the Apprentices' Library, the Friends' Asylum, at Frankford, and various other benevolent associations. He records as his experience that he has invariably suffered loss by yielding to the temptation of outside undertakings, and that he owes all his success to close attention to his legitimate business.

ROBERT WETHERILL & CO., Chester, Manufacturers of Corliss Steam Engines, Stationary Engines, Boilers, Shafting, Mill Gearing, Hoisting Machines, and General Machinery.—This firm originated in a co-partnership, formed by the two brothers, Robert and Richard Wetherill, on January 1st, 1872. Having purchased the property now occupied at Sixth and Upland streets, they erected large and substantial additional buildings and engaged in the present enterprise. The main works occupy a lot 270 by 100 feet, and they have an additional property, 200 by 100 feet, on the East side of Upland street, which they use for storage. The machine shop is two stories in height, 80 by 40 feet, with foundry attached, 100 by 50 feet. The boiler shop is 100 by 40 feet, and to it are attached a two-story pattern loft and stables, 100 by 30 feet. The works are filled with the newest and most improved machinery made for them by William Sellers & Co., and William B. Bement & Son, of Philadelphia, and E. & A. Betts, of Wilmington, Delaware. They give employment to about seventy hands. The firm make a great variety of machinery, and the work is all of the very best quality. They are able to produce an average of one Corliss steam engine, with all the necessary accompaniments, per week, beside a number of boilers and a large quantity of other machinery. They

devote especial attention to the erection of Corliss engines, which are acknowledged to be the best in the world for economy in fuel and cost of running. While manufacturing every variety of boilers, they are particularly engaged upon the double tubular pattern. By the use of the best material, the employment of the most skilful workmen, and a careful personal supervision, they have earned an enviable reputation.

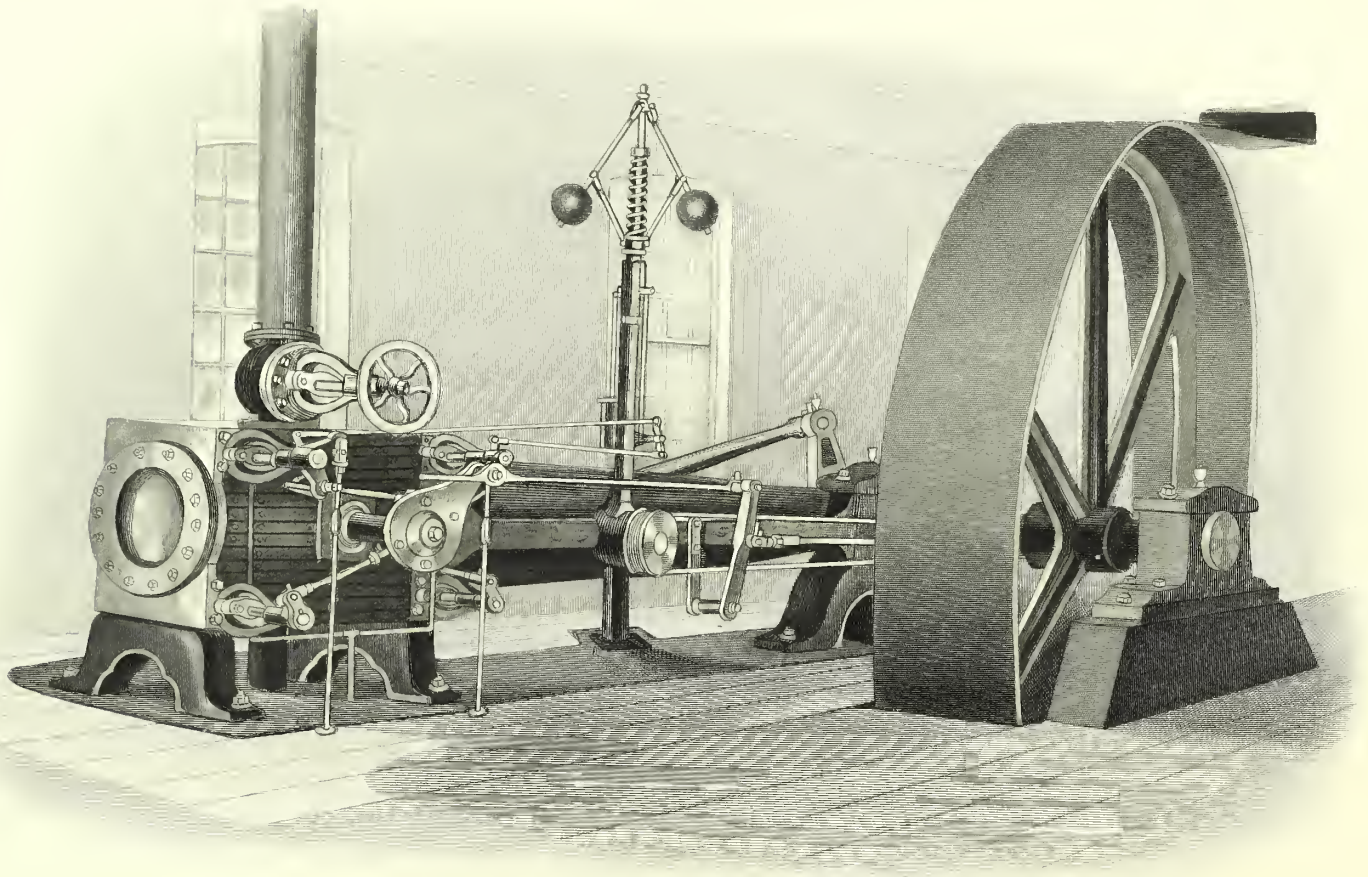
ROBERT WETHERILL was born in Lower Merion, Montgomery county, Pennsylvania, September 4th, 1847. He received a fair education in various institutions, including some years at the Upland Normal School, and a period at the Broad Street Academy, of Chester, Pennsylvania. His parents having removed to Chester, in 1863, he entered the machine shop of Miller & Allen, on January 1st, 1864, as an apprentice for four years to the machine business. He subsequently became the head draughtsman of the firm, designing many improvements in machinery. He continued there until he embarked in the present undertaking, to which he has contributed his energy and skill as the draughtsman and designer of machinery, at the same time attending to the disposal of goods.

RICHARD WETHERILL was born in the same place, September 28th, 1850, and was principally educated at the Broad Street Academy, at Chester. He became a clerk to the Chester Creek Railroad, in December, 1869, where he remained until he engaged in the present enterprise, and became the financial partner.

LEEDOM, SHAW & STEWART, Carpet Manufacturers, Philadelphia.—This firm is the result of the consolidation of the concerns of Leedom & Shaw and Stewart Brothers, who had both been previously engaged in the same line of manufacture in an extensive way. The organization was effected on the 1st of January, 1870, the united business immediately becoming prosperous. The buildings now owned and occupied by the firm are situated on Hope street, north of York street, in the upper portion of the city. The main building is a five story brick edifice, 73 by 38 feet in area, and has adjoining it a drying house, 45 by 20 feet, and two stories high, besides a structure used as a dye house, of one story in height and 45 by 24 feet in dimension. These commodious premises enable the firm to keep in operation 150 looms, and give constant employment to about 200 hands in the various departments. In addition to the above, they have salesrooms at No. 635 Market street, presided over by the senior partner, who assumes the entire charge of this branch. In their operations, particular attention is paid to systematizing the labor, each one of the partners having control of a separate department, a plan which produces the most beneficial results. Since the formation of the present partnership, the business has increased very rapidly, the annual sales now amounting to nearly 600,000 yards of various descriptions of carpeting, a large portion of which is of exquisite design, and produced by an invention of their own, which they have secured by patent.

THOMAS L. LEEDOM, the head of the firm, was born in Bucks county, Pennsylvania, near the village of Newtown, March 27th, 1828. He received the best education a country school could afford, and which was snatched from his labors on his father's farm. At the age of twenty-two, he proceeded to Cincinnati, where he obtained a situation in the carpet house of Ringwalt & Bare, with whom he remained for one year, and then entered into an engagement with John Shillito & Co., in the same business. After remaining with them for ten years, he was admitted as a partner into the concern. He remained with that house till July, 1865, when he removed to Philadelphia and formed a partnership with Aaron Shaw in the carpet trade. During his residence in Cincinnati, he was married, and has since had a family of two children.

THE second partner in the firm was born in Philadelphia, July 13th, 1824. His early life was chiefly passed on his grandfather's farm, at Wales, Massachusetts, where he obtained, during the intervals of labor, such education as circumstances would permit. In 1844, he went to Philadelphia, to learn the trade of an upholsterer, which he subsequently followed in Cincinnati, working as a journeyman. At the expiration of eighteen months, he had saved $700, with which he embarked in the furniture business, with Henry Rettig, their sales amounting, during the first year, to about $10,000. In 1858, this association was dissolved by the death of his partner, and he originated the firm of Shaw, Johnson & Co., whose annual business amounted to about $200,000. During the civil war, he bought the interests of his partners, and managed to pass through the crisis with a loss of some six or seven thousand dollars. After a brief rest, for the benefit



CORLISS STEAM ENGINE.

Built by Robt. Wetherill & Co. Chester, Pa

of his health, he became a member of the present firm. He was married November 7th, 1843.

THE junior partners are Robert and Arthur Stewart, both natives of Paisley, Scotland, and born respectively, September 1st, 1833, and September 6th, 1841. Their father was a native of Tyrone, Ireland, and, by occupation, a farmer and linen weaver. In 1831, he removed to Scotland, and, in 1841, emigrated to the United States, where he commenced the manufacture of carpets, in a small way, in Philadelphia, working four looms and seven hands. His business gradually increased, and he purchased a lot, on which he erected suitable buildings for his manufacture. In 1866, his sons became partners in the business, which they carried on successfully, after the withdrawal of their father, in the following year. In 1867, they were working fifty looms and employing about sixty hands. They both received a public school education, and a thoroughly practical one in their business. The elder was married in July, 1866, to Mary Stewart, and has three children, and the younger on April 7th, 1870, to Emma Kensil, by whom he has one child.

GROSSMAN & MUNN, Manufacturers of Fine Furniture, Philadelphia.—This business was established at 113 North Second street, in February, 1866, by Gustave Grossman and Sigismund Kragler. It was removed to 210 North Second street in the early part of 1868, and James P. Munn having succeeded the junior partner, August 1st, 1868, the firm assumed its present style. Finding their accommodations too limited for the supply of their constantly increasing trade, they gradually occupied the adjoining property (No. 208), and now have a front of 38 feet on Second street, and a depth of 130 feet. The buildings are four stories in height, the first floor of 210 being occupied by offices and salesroom, while the second story is devoted to the storage and showing of the finer suits of furniture. The adjoining rooms of 208 are used as the upholstery department. The workshops occupy the third and fourth floors, as well as capacious buildings in the rear. Each department of their factory is under the direction of a skilled mechanic, while over the whole the members of the firm exercise a careful supervision. They manufacture fine furniture alone, and are principally engaged in filling orders. Their products include parlor and chamber suits, with dining-room, library and hall furniture, made after their own original designs. They have a large city trade, furnishing many dwellings of wealthy citizens, offices, hotels, etc. Their furniture is superior in quality and design, and, under prompt and energetic management, its reputation has become widely spread throughout the city and surrounding country.

GUSTAVE GROSSMAN was born in Saxony, Germany, on December 20th, 1835, and was educated there. He came to America in 1849, and settled in New York, where he learned the cabinet making and varnishing trade. Removed with his parents to Camden, New Jersey, in 1852, and worked as journeyman for Adolph Heling, on Pine street below Sixth; also in various leading houses in Philadelphia, including those of George Henkell and Moore & Campion. From the last mentioned firm he went into business on his own account, in March, 1859, at 519 Arch street. After various business changes, he formed a partnership for the foundation of the present enterprise.

CHARLES ABBEY & SONS, Manufacturers of Dentists' Gold Foil, have their establishment at No. 230 Pear street, Philadelphia, in a substantial five story brick building, erected for the purpose. The works were originally located in Hartford, Connecticut, and were operated by Marcus Bull, who was then, as far as known, one of the two gold beaters in the United States. In 1816, he removed the whole concern, including tools and machinery, to Philadelphia, where, after a brief sojourn in another locality, he settled in Pear street, on a site adjoining that now occupied. It was by this establishment that dentists' gold foil was probably first successfully made; and, in 1835, when Marcus Bull associated with him Charles Abbey, who had been for some years the manager of the business, and had contributed much by his mechanical skill to the perfection of this new branch of manufacture, the making of gold leaf was entirely abandoned and the whole attention of the new firm, which continued under the name of Marcus Bull, turned to the production of dentists' gold foil, which is still their only product. In autumn, 1839, Marcus Bull disposed of his interest to Charles Abbey, who thus became sole proprietor, and so continued until August 1st, 1847, when he associated with him his eldest son, William R. Abbey, under the firm name of Charles Abbey & Son. Again, on January 1st, 1853, he admitted another son, Charles O. Abbey, and the firm became Charles Abbey & Sons, the

present style. They take the raw material, and do their own refining, melting, etc. Their goods are sold in all parts of the civilized world, and their exeellence has been aeknowledged by medals from expositions at London, Paris, Vienna and the different industrial exhibitions in the United States. The establishment is probably the largest devoted to this braneh of industry in the United States.

CHARLES ABBEY was born in Hartford county, Connecticut, March 6th, 1798, and was a son of Captain Russell Abbey. He was educated in the country schools of his native county, and, in 1812, became an apprentice to the gold beaters trade, with Marcus Bull, at Hartford. He removed with him to Philadelphia, in 1816, and, in 1820, became the manager of the whole business, which he continued till his association in partnership with his employer, in 1835. He has been an active worker in Whig and Republican parties, and for many years occupied a seat in the Councils of Philadelphia. Though far past the meridian of life, his physical and mental powers are well preserved, and he enjoys an unusual measure of pristine vigor.

WILLIAM R. ABBEY was born in Philadelphia, June 14th, 1825. He received his education in the private schools of Philadelphia; entered the establishment in the spring of 1839, and, after having served the regular apprenticeship, he finally became associated with his father as partner, and has for many years been the leading business man of the firm.

CHARLES O. ABBEY was born in Philadelphia, October 5th, 1830. After due preparation, he entered the Central High School, of Philadelphia, whence he graduated in January, 1847. He became an apprentice with his father the same year, and was admitted to partnership on January 1st, 1853.

WILLIAM HUNTER & SONS, Carpet Manufacturers. — This firm commenced operations in 1857, when its head rented a two story building, 18 feet square, on Hanover street, and started in the business for himself, with three looms, adding to the number as his orders increased. In 1863, it was necessary to enlarge his facilities, and he accordingly rented two adjoining buildings of the same size, where he prosecuted his business until he purchased the premises now occupied by his factory. This is known as the Cumberland Mills, and is situated at Nos. 610 to 616, inclusive, on East Cumberland street, Philadelphia, extending through to Dickinson street, with a frontage on both of 72 feet. The property was purchased in 1866, and on it was erected a three story brick building, 24 by 36 feet, which constituted the works until 1868, when another structure was added, of the same dimensions, and also an additional building, 14 by 14 feet, with basement. The present capacity of the establishment is forty-four looms, producing annually about 160,000 yards of various grades of carpetings, consuming in their manufacture 240,000 pounds of wool and giving employment to nearly sixty operatives. One of the peculiar features of this manufactory is an invention, due to the talent of Samuel H. Hunter, whereby a greater number of colors can be displayed on the same longitudinal line, and more intricate patterns produced, than by the ordinary process, which is only capable of producing two on the same line. This invention has been patented, and by it can be manufactured a carpet equal in coloring to the Brussels, and very closely resembling it in texture and other points. Of this class of carpet, large quantities are manufactured, which, while as elegant and durable as the imported fabric, can be sold at thirty-five cents a yard cheaper. This desideratum is one of the causes of the large demand for the carpets woven at the factory.

Its founder was born in Woolwich, near London, England, January 1st, 1816. His parents were of Irish nationality, but his father was a soldier in the British army. In infancy, he was placed with an uncle, a farmer, residing in the county of Donegal, Ireland, with whom he remained till his majority. About this time, he was married to Mary Richey, and commenced the manufacture of linen on his own account. In 1848, he emigrated, with his family, to this country, landing at Philadelphia, August 15th. After some previous employment, he was engaged by James and William Hogg, as a carpet weaver, and subsequently by Robert Stinson, with whom he remained till 1855. After a brief time spent in farming in Delaware, he returned to Philadelphia and resumed his occupation with Robert Stinson, which was continued till 1857. At this period, he rented the building already mentioned, and started his present establishment.

His eldest son, William Hunter, was born in Donegal, Ireland, September 10th, 1837, and accompanied his father to this country. In 1861, he was

William Hunter

married to Elizabeth Craiggin, and, in May following, enlisted as a sailor on board the frigate "St. Lawrence," serving as such till July, 1864, when he returned home, joined his father in the carpet weaving business, and, in 1867, was admitted as a partner in the concern.

SAMUEL H. HUNTER, the second son, was also born in Donegal, January 12th, 1842, and received his education chiefly in Philadelphia, remaining at school till the age of thirteen years. At that time he commenced the weaving of carpets, continuing so employed till 1862, when he embarked as a sailor on the sloop "Jamestown," seeing much service in the China and Japan seas till 1865; then he returned home, and, in the following year, became a partner in his father's business, adding, by his subsequent invention, greatly to the success of the establishment. He was married April 3d, 1867.

ENTERPRISE PLANING MILL, Reading, Jacob H. Deysher, Proprietor, was established in 1848, with an office at No. 414 South street, in that city. The capital employed at the commencement was $700, an amount earned and saved by the founder at his trade of millwright. He began on a small scale, with the assistance of but one hand; but, during the first year, the amount of ware produced was $7000. The business gradually but steadily expanded, as will be seen by the following figures: In 1853, the product was $45,000; in 1858, $65,000; and, in 1863, it had reached $80,000. The present condition of the business is prosperous, and the factory employs twenty-five hands, with a capital invested in the business of $25,000. The premises are extensive, the mills, lumber yard and wharf occupying a space of three and a half acres. The articles dealt in are all kinds of lumber, furniture, doors, blinds, shutters, frames, mouldings, turnings, and others too numerous to mention, and the amount of sales during the past year reached $60,000. He employs no superintendent but his son, a lad of sixteen years of age, and attributes his success to steady habits, a very careful attention to his own business, and a thorough acquaintance with its details, acquired by practical experience in judging the quality of lumber. In 1869, he tried the experiment of employing foremen in the different departments of the trade, to relieve himself of the necessity of personally examining the work; but with the most unfortunate results, as the balance sheet at the end of the year showed a per centage of only $1.59 on a business of $80,000. Previously, and since, his per centage has been very much higher, and he has resolved to retain the entire management in his own hands.

He was born in Oley township, Berks county, Pennsylvania, May 10th, 1822. His parents' names were Jacob and Maria Deysher. He obtained his education in his native place; after that, began to learn the trade of a millwright, at the age of eighteen years. Continued that business for three years, as an apprentice to John Knabb; he then went to work for himself on railroads, canals, or at his special trade. On the 1st of December, 1847, he ceased to labor at his trade, and commenced dealing in rags, selling them to the paper manufacturers. He also sold wrapping paper, by sample, which he gave in exchange for the rags bought. In this way he had dealings with Joseph Kimper and other paper makers of Philadelphia. His place of business was in the same location as at present, but he did not enter into the exclusive line he is now engaged in till 1861. He has occupied several important positions in Reading. He was school director and a member of the Common Council, and is at present a stockholder in the Wilmington & Reading Railroad. He was married, July, 1851, to Anna K. Scheafer, of Amity, Berks county, by whom he has had three children. He and his wife and one child are members of the Methodist Episcopal Church (St. Peter's) at Reading.

THE UNITED STATES FURNITURE AND CHAIR MANUFACTORY, Philadelphia.—The proprietor, William T. Richardson, was born in Smyrna, Delaware, March 19th, 1832, and received a limited education in his native place. He lost his father when he was in his thirteenth year, and went immediately to the cabinet maker's trade, with John Noblitt, of Wilmington, Delaware. In the autumn of 1847, he came to Philadelphia, and placed himself under the instruction of Mr. Steel, on Ridge avenue below Callowhill street. From 1854 to 1857, he was a journeyman with James Irvin, and went thence to work for Charles Gorman, on Sansom street above Tenth. He afterward removed to Indianapolis, whence he returned in the spring of 1859, and worked for T. & J. A. Henkel, on Sixth street below Jefferson, until 1861, when, with a cash capital of $5, and his own energy, he engaged in business on his own account, at Camac and Jefferson streets. As a reward of

his industry and perseverance, he was obliged, by want of room, to remove to Middleton's mill, on Marshall street below Girard avenue, in 1862, and there he employed six hands. In 1863, he sought the enlarged accommodations of Faunston's mill, on Edward street, where he remained until 1868, when his business had assumed such proportions that he occupied the present works, at Sixth and Oxford streets, which had been previously occupied by the United States Army Laboratory. There he has introduced almost every improved labor-saving machine suitable for his business, and the comparatively small amount of hand work is performed by about fifty hands. The employment of the best machinery enables him to produce good work at the most reasonable prices. He manufactures furniture of almost every variety, including walnut chamber and parlor suits, marble top tables, hat racks, piano stools, etc., beside mattrasses and upholstery in general. His wholesale and retail warerooms, from which his products are sold, are located at 347 North Second street. The retail trade was commenced May 1st, 1873, and the total sales amount to about $150,000 per annum. Owing to the stringency in money matters, brought on by the panic, commencing in September, 1873, he sold his large stock of goods in his warerooms at public sale, preferring to sacrifice rather than fail to meet obligations, or ask an extension from creditors. At the same time he removed his salesrooms to his factory, at Sixth and Oxford streets. He has eschewed politics and public life, devoting himself to business, and reaping, by his persevering and untiring efforts, a liberal reward. He owes his marked success to his own individual persistent labor.

VICTORIA MILL, Chester, John Gartside, Proprietor, was founded by the present owner, in 1860, and has been carried on by him since that time. The original factory was 65 by 33 feet in dimension, and four stories in height; but, in 1873, he erected an additional structure, 50 by 33 feet, making the main building, as it now stands, 115 by 33 feet, with a uniform height of four stories. There is also a wing attached, which was built in 1865, with an area of 125 by 24 feet, and necessary outbuildings. The mill is admirably furnished with all the machinery requisite for the business, consisting of three sets of woollen machinery (two others are about to be added), thirty-six looms and all other needful appliances, in the shape of dyeing and drying apparatus, and is, in every respect, completely fitted in all its details for the manufacture of woollen goods. It employs at present fifty hands, for whose accommodation eight houses have been built. The proprietor makes his own warp, and consumes about 200,000 pounds of cotton and 100,000 pounds of wool per annum. He manufactures 300,000 yards of goods each year and pays out in wages about $1200 per month. He commenced by the manufacture of Kentucky jeans, which he continued for some five or six years, and then turned his attention exclusively to the making of cassimeres, of which he produces a great variety of styles and qualities. Those made for winter wear are composed entirely of wool, while those intended for summer goods have a mixture of cotton interwoven in the fabric. Nothing but new material is used in the manufacture, everything in the shape of "shoddy" being rigidly excluded from the factory. The machinery employed is of the best make, and of the most approved designs that can be obtained, no expense being spared to place this mill, in that respect, on a footing with any in the country. Immediately prior to commencing his present enterprise, the proprietor occupied but one room, which he rented in his father's mill; and the great stride he has made since that time is doubtless due to the care taken in the selection of the stock and the absolute exclusion of all improper material from the manufacture, combined with a thorough knowledge of the business and the use of the most perfect machinery.

JOHN GARTSIDE was born in Lancashire, England, October 25th, 1821, and is the son of Benjamin Gartside, whose record will be found elsewhere in this volume. His education was received in his native country, where he began to learn the "piecing" business. In 1831, he came, with his parents, to this country, and worked for a time for James Kershaw, at the Blockley Mills, Philadelphia. In 1835, he accompanied his father to Manayunk, and, when the latter engaged in business for himself (1838), he worked for him, continuing to do so till 1850. In that year, he removed to Chester, and formed a partnership with Samuel Cliff (Cliff & Gartside), in the dyeing business, continuing in the same till 1852, when his father having erected the Keokuk Mills, he rented a room there for the prosecution of his legitimate trade. During the Rebellion, he served as one of the emergency recruits, in the Gettysburg campaign, leaving his business temporarily for that purpose. Since 1870, he has been a director in the First National Bank, of Chester, where his abilities as a

Girard College, Philadelphia.

AXY PHILA

John Gartside.

business man have been prominently displayed. His career in his various pursuits has been very successful, identifying him with the progressive spirit of the age.

MAJOR JOHN A. HADDOCK, Printer and Lithographer, was born in Hounsfield, Jefferson county, New York, October 17th, 1823. He is descended from English and German families, but his parents were American born. At the early age of ten years he was apprenticed to the printing business in the office of the *Democratic Standard* at Watertown, New York, and after serving the regular old-fashioned seven years' apprenticeship, became a student in the Black River Literary and Religious Institute, a Presbyterian school, in the same place. There he acquired a first-class academic education, and, during two years of his course, was also a student at law in the office of Lansing & Sherman, besides working, at odd times, at case in the printing office of Knowlton & Rice. At twenty years of age he married Mary F. Lull, his present wife, and immediately gave up the study of the law. Through the influence of Hon. Orville Hungerford, M. C. from the Jefferson county district, he secured a responsible position in the Congressional printing office of Richie & Heiss, at Washington, but at the expiration of a year returned to Watertown, to become one of the proprietors of the *Democratic Union*, which he soon placed upon a sound financial basis, and continued to publish for several years. Having become affected by the California gold fever, which had been raging for some time, he sold his interest in the newspaper, and, after making ample provision for his family, went to California *via* Panama. He at once started to work in the mines, near Dent's ford, on the Stanislaus river. This ford was named for General Lewis Dent, and President Grant, now his brother-in-law, was then Lieutenant in charge of the distribution of beef cattle to the Digger Indians from that point. Mining proved too laborious, and he soon entered the office of the *San Joaquin Republican*, at Stockton, at $12 a day, working side by side with Joseph Mansfield, who was killed shortly after in a street fight, and was the father of Josephine Mansfield, who figured so prominently in the Fisk and Stokes affair. After several months spent at Stockton he went to San Francisco, where he was employed in Bernard's job office at $14 per day; but at the end of a year he returned to Watertown, and having purchased an interest in the Foundry and Farmer's Implement Manufactory, at Theresa, Jefferson county, New York, removed thither with his family. After two years of energetic labor he sold his interest to his partner. He then bought into the *St. Lawrence Republican* office at Ogdensburg and returned to his legitimate business; but, disliking the separation from his family, he sold at a large advance at the end of a year, and removed with his family to Watertown, where he purchased a half interest in the *Watertown Reformer*. Thence his memorable balloon voyage was made in company with Professor La Mountaine, September 22d, 1859. They ascended from Watertown at the close of a stormy day, and having passed above the clouds, travelled nearly 400 miles, and landed in the Great Canada wilderness. After suffering great privations, and being without food for four days and a half, they were rescued by a travelling lumberman and his Indian guides, who conducted them to Ottawa, whence their safety was communicated to their friends, who had heard nothing of them for thirteen days. His co-partnership expired by limitation in the winter of 1860, and he purchased the Watertown Cotton Mills, which he thoroughly repaired and filled with new and improved machinery. The breaking out of the Rebellion found his mills in successful operation, but the high price of cotton, which soon put a stop to nearly every cotton mill in the North, rendered it impossible to manufacture the coarse goods for which the Watertown mills were solely adapted, with any profit. Having closed his business, he became 1st Lieutenant of Company E, 35th Regiment New York Volunteers, was promoted to the rank of Captain, and at the expiration of its term of service returned with his command to Elmira. He was then commissioned Captain in the Veteran Reserve Corps of the United States Army and was assigned to duty as recruiting officer, serving at Springfield, Illinois, Washington, District of Columbia, Buffalo, New York, Norristown, Pennsylvania, and Elmira, New York. He was commissioned Major in 1864, and continued in the service until 1866, when he returned to Watertown, after four years of active and efficient service, to find his affairs so much involved that it was only by the most rigid economy he was able to pay his indebtedness. Left without capital, he resolved to seek a wider field, and one promising an adequate return for industry and skill. Accordingly, he removed to Philadelphia, in autumn, 1866, where he sought employment in the leading printing offices of the city without success. He then opened a job office at Decatur and Market streets, where he soon took into partnership his eldest son, under the firm name of Haddock & Son, which still continues, the partner being now Edwin C., his second son. For the

advantage of steam power they soon removed to the *Evening Telegraph* building on Third street near Chestnut, where their business rapidly increased. In 1872, they removed to the large building, No. 106 South Eighth street, where they now occupy the three stories, and have a complete printing office. He himself is probably the hardest working printer in the city, putting in full eleven hours at his office every working day, and regularly opening and closing the place. Twice in life he has lost all he had acquired by indulging in outside speculations, and now his great success and position afford an ample illustration of the importance of adherence to the occupation in which one has mastered all the practical details.

THE POTTSVILLE ROLLING MILLS AND PIONEER FURNACES, Pottsville, conducted under the name of Atkins Brothers, date their origin to the year 1853, when Charles M. Atkins, in conjunction with two of his brothers, purchased from the Greenwood Company, of Philadelphia, the property now known as the Pioneer Blast Furnace, which, at that time, consisted of one ten feet stack only, with a capacity of 60 tons a week, and employing about 15 or 16 hands. The original firm was composed of Hanson E. Atkins, Charles M. Atkins and William Way Atkins; but since the death of the senior and junior partners it has been represented by the second member of the firm alone. Under the administration of the new firm the business developed rapidly till, in 1860, they were compelled to rebuild the furnace, enlarging it and adding many improvements, which about doubled its producing capacity. In 1866, owing to increase of business, they were obliged to build No. 2 stack, with a thirteen feet wash, whereby their means of production were increased 100 per cent.; and again, in 1872, it was necessary to build No. 3 stack, with a fourteen feet wash, to meet the demands of their growing business, which then amounted to 23,000 tons of iron per year, giving employment to 130 men, and producing a money value of nearly a million dollars. About 1864 the firm bought the Pottsville Rolling Mills, having at that time a capacity of about 2000 tons a year. They entirely rebuilt and refitted these works, enlarging them, so that, in 1872, they were able to turn out 19,000 tons of T-rails per annum, representing a value of $1,500,000, and employing 450 men and boys on the premises. In 1861, they purchased the Montgomery Furnace, at Port Kennedy, in connection with John Shippen, George W. Snyder, and Morris and Joseph Patterson, of Philadelphia. This concern, which had previously been a financial failure, proved, under the new management, which practically was that of the Atkins Brothers, a complete success. The firm eventually sold out their interests in this establishment to the other partners. In 1862, they leased the Duncannon Furnace, at Duncannon, Perry county, Pennsylvania, which was in a condition very similar to that of the one at Port Kennedy, but it was shortly converted, by their enterprise, into a prosperous concern. They thus had the management of four concerns, two in Pottsville and two elsewhere; the total amount of their business transactions reaching to about four millions per annum. This latter branch of their business was placed under the charge of the junior member of the firm, to whose judicious management is ascribed its success. The firm obtain their coal and iron from their own mines, and the present representative is perhaps the largest individual proprietor in the State. He pays, as toll, to the Reading Railroad Company about two hundred thousand dollars annually. He has sold out his interest in all outside concerns, confining his attention exclusively to his two establishments in Pottsville.

THE senior member of the firm, Hanson E. Atkins, was born in Chester county, Pennsylvania, in 1820, and died in Pottsville, Pennsylvania, in 1870. In early life he was engaged in the transportation business; but for eighteen years previous to his death he was an active member of the above named firm.

THE junior partner, William Way Atkins, was also born in Chester county, in 1829, and died at Duncannon, in 1863. Throughout the whole of his business life he was identified with the iron trade.

CHARLES MINER ATKINS, the surviving partner, was born in Chester county, Pennsylvania, in 1827. He is the son of William Atkins, a miller of that county. After receiving a good ordinary education he served an apprenticeship of two years and a half to the tanning trade, and then entered the transportation office of his father at Columbia. The six years which he spent in that office proved very serviceable in training him for business life. Here were raised many of the leading railroad men who were engaged, sooner or later, by the king of railroads, J. Edgar Thomson. The progress of the Pennsylvania Railroad Company having abolished the transportation office, the parties employed there were compelled either to apply to the company for

Elmwell Village Mills, Humphrey's, Hopkins, Clapp, Elmwell & Co

Chas M. Atkins

positions or to seek employment elsewhere. Charles M. Atkins adopted the latter course, and commenced business in Pottsville, in 1853. At the outbreak of the Rebellion he joined the Republican ranks; and though his father was a Democrat and a Quaker, he lent most effectual aid to the cause of the Union by equipping and sending out recruits from amongst his work-people. He maintained their families during their absence, and restored their situations on their return. He was married in 1854 to a daughter of the Rev. Mr. Pryor, of Pottsville, by whom he has had a large family, eight of whom are still living. In private life he is generous as a citizen, affectionate as a parent, and universally esteemed.

ANDREAS HARTEL, Calico Printer, was born in Wigstadt, Province of Silesia, Austria, November 1st, 1828. He received the common school education at his birth-place, where he remained until he was fourteen years of age. Having at this time lost both of his parents, he was invited by a relative who resided in Galicia, Poland, to enter his commercial house, which he accepted, and forthwith proceeded to that point, and remained there till his departure for the United States. On his arrival in Philadelphia he presented himself to his uncle, Joseph Ripka, well known as the proprietor of the large manufacturing mills of cotton goods at Manayunk, etc., who in turn gave him every opportunity to become thoroughly acquainted with all the details of his very extensive business. He remained with him for four years, and in 1852, in connection with his cousin, Andrew A. Ripka, was established in the calico printing business through the generosity of his uncle. He was now twenty-four years of age, and at the head of an establishment which he was eminently qualified to direct; but for five years thereafter there were innumerable difficulties to surmount, as the times were those of great financial distress to business men generally. In the summer of 1857 occurred those disastrous failures which spread ruin far and wide through the length and breadth of the country. It was during this year also that a change was made in the *personnel* of the firm. His cousin, Andrew A. Ripka, left the business to enter into partnership with his father, while John B. William became associated with him in the business, and this partnership was continued until 1864. Since this time only, and aided by the utmost perseverance and continuous application, has the business proved a success. He is a Lieutenant of Company C, 4th Regiment of the Reserve Brigade.

YUENGLING'S EAGLE BREWERY, Pottsville. This establishment was founded in 1829, and grew from very small beginnings. The proprietor, D. G. Yuengling, had erected a brewery of fair dimensions and capacity; but, in 1832, his property was destroyed by fire and he lost all he possessed, at the same time being left with a debt of $2000 to contend against. This blow, though discouraging, did not crush his energy, and, with the aid of friends, who had entire confidence in his integrity and ability to redeem his losses, he was enabled to rebuild his brewery and remedy his misfortunes. From time to time, and especially in 1845, he made gradual but important additions to his buildings, the capacity of his establishment being at that time from 40 to 50 barrels a day. His business steadily increased, as did his reputation for fine ales and porter, to which he confined himself exclusively till about 1850, when he began brewing lager beer also. The business, which commenced on such a diminutive scale, now embraces the counties of Schuylkill, Carbon, Cumberland, Northumberland, Luzerne, etc., besides shipments to various points in the United States. The present sales reach 21,000 barrels, being 50 per cent. of all sold in that Congressional District, and the business amounts to $250,000 a year, requiring 40 men in the brewery. The office is in charge of Major Levi Huber, who served in the 96th Pennsylvania Regiment, and saw much active service in the army of the Potomac. His management of this department is able and satisfactory. No business requires more care and attention in keeping up a uniform and good quality in the article produced, than does the brewing of malt liquors, and to a constant maintenance of a high grade of ales, porters and lager beer, the Eagle Brewery undoubtedly owes its reputation and success. From this establishment has grown one of the largest breweries in the country, at Richmond, Virginia. F. Betz, a brother-in-law of Mr. Yuengling, formed a partnership with Mr. Beyer, a son-in-law, and D. G. Yuengling, Jr., the father of the latter furnishing the bulk of the capital. Under the style of Betz, Yuengling & Beyer, the business was started, but D. G. Yuengling, Sr., ultimately bought out the concern and the real estate. This brewery

is now leased, from his father, by D. G. Yuengling, Jr., who has taken his former foreman and clerk into the business with an interest. He (D. G. Yuengling, Jr.) has also a large brewery in New York city.

D. G. YUENGLING was born in Wurtemberg, Germany, in March, 1806. He is a son of G. F. Yuengling, a brewer in the same country; and, after learning the business in his father's establishment, came to the United States at the age of twenty-two years, settling at once in Pottsville. There he immediately commenced, on a small scale, brewing about five barrels of strong beer a day. At that time Pottsville was but a village, not containing a population of more than 200, and the demand was consequently small. He continued in this way for some years, making nothing but strong beer, but gradually increasing with the growth of the town, until he was enabled to build a brewery on the site of his present establishment. He has thus grown, in spite of many drawbacks, with the prosperity of Pottsville, until he has reached his present position. He has been married twice; the second time to Miss Betz, of Schuylkill Haven, and has three sons. One, already mentioned, is in Richmond. Frederick G., a young gentleman of superior ability and promise, is in the brewery at Pottsville, and was admitted as a partner in October, 1873. He is destined to succeed his father, and will undoubtedly prove a worthy successor. The third son is W. G., a boy of twelve years. D. G. Yuengling is emphatically a self-made man, of sterling integrity, industry and indomitable German perseverance. He expects soon to retire from active business, the state of his health requiring such a step. A fine view of the extensive works will be found opposite, which furnishes a more adequate idea of their facilities than columns of description could convey, and illustrates in this work the monument to his industry, energy and worth.

THE PALO ALTO ROLLING MILLS, Pottsville, Benjamin Haywood, Proprietor, were established in 1856, by the present owner, who purchased an interest in the works, on his return from California, and started the business under the name of Haywood, Lee & Co., for the manufacture of rails of every description. It then consisted of only one small mill. The name of the firm was afterwards changed to Benjamin Haywood & Co., and subsequently to that of the present proprietor, who has for many years carried it on alone. Being independently wealthy, he continues the concern, especially during the present depression (1873), solely for the benefit of those employed. The capacity of the mills is now 20,000 tons per annum, the manufacture being principally that of T and street rails, particularly the latter; and it is interesting to know that the man who, about forty years ago, tramped about Philadelphia, unable to find a job, now makes the rails on which millions ride. The number of hands employed is 500, with a monthly pay roll of $20,000, and the total amount of yearly business is from one to one and a half millions of dollars. All this is controlled by one man, who conducts the business as easily as when it was a small concern. He was born near Nottingham, England, in 1805, his father and grandfather having both been manufacturers of hardware. He was apprenticed, at the age of twelve, to a blacksmith, with whom he worked till 1829, when he emigrated to the United States, landing at New York. Being unsuccessful in obtaining employment there or in Philadelphia, he walked to Pottsville, where he commenced working at his trade, waiting for an opportunity of starting in business for himself. He soon began in a small way, and found his business increase, so that he was compelled to enlarge his facilities. By industry and economy, he accumulated money, and, in 1833, when it was found necessary to mine below the water level, his keen judgment and enterprise led him to go to Philadelphia, where he purchased a steam engine for pumping out the water from the mines. He also made contracts with some Philadelphia firms for lathes and other machinery, and G. W. Snyder went over to put up the engine which was the first to be erected in Schuylkill county. The latter started a small machine shop at Port Carbon; but, requiring greater facilities, removed it to Pottstown, where the well-known firm of Haywood & Snyder was established (1835), for building engines and necessary mining machinery, in which and rolling mill machinery it was soon largely engaged. In 1835, they built the first steam engine in Schuylkill county, and, in 1845, erected large works at Danville, and there, as well as at Pottsville, made the first machinery for the Montour Iron Works, at Danville (rolling mill and blast furnace), and that for Reeves, Whittaker & Co. (now the Phœnix Iron Company), designed for the manufacture of rails. They also constructed the machinery used by Peter Cooper, of Trenton, New Jersey, and that for the blast furnace of Bevans, Humphreys & Co., of Allentown. At Danville, they made the first set of rolls for manufac-

Yuengling's Brewery, Pottsville, Pennsylvania.

D. J. Gaugling

turing T rails in the United States; also designed and got up the first apparatus for sawing hot iron, in 1845. Aside from their heavy operations at Pottsville and Danville, they were largely engaged in extensive coal mining operations, under the firm name of Miller, Haywood & Co. These operations were continued till 1850, when Benjamin Haywood, who, during all those years, had borne the chief weight of the business, sold out all his interests to the others. In that year, he moved to San Francisco, California. He had purchased a large number of frame houses, for the use of the miners there, but found it impossible to sell them, on their arrival, for more than was insufficient to pay freight. Having lost heavily by this speculation, he went to Sonora with some friends, in 1851, taking with him a steam engine and saw mill, for the lumber trade, this being the first steam engine erected in California, outside of San Francisco. After struggling for eight months, he found the business unprofitable, and disposed of it for a mere trifle, returning to San Francisco without means. He then borrowed $150 from one of his apprentice boys, and started again in the blacksmithing trade. His business increased rapidly, and he shortly began the manufacture of iron shutters, fire proof doors and bank vaults, in which he was remarkably successful and acquired money. He made a fire and burglar proof vault for General William T. Sherman (Lucas Turner & Co.), and received highly complimentary letters from the general, also from the mayor and authorities of the city, on the excellence of his work. He was one of the organizers of the Mechanics' Institute, in San Francisco, and its president up to the time of his departure. While residing there, many offices of trust and responsibility were urged upon him; but he declined them all. He formed many friendships, becoming intimate with General William T. Sherman, also the late Governor John W. Geary, of Pennsylvania, and remained a firm friend of the latter till the day of his death. After an absence of five years, he returned home on a visit, intending to go back to San Francisco; but was induced, by family reasons, to settle permanently in Pottsville. In 1856, having sold out his business in the West, he bought an interest in the Palo Alto Rolling Mill, which he has since conducted. In 1862, he had the entire supervision and control in the erection of the works of the Allentown Mill Company, and was president of the company for some years. In 1865, at the special request of Simon Cameron, he constructed the Lochiel Iron Works, at Harrisburg. His whole career, since 1829, has been identified with the interests of Pennsylvania, and few men, if any, have done as much as he has for the advancement and improvement of Pottsville. He has been, emphatically, the workingman's friend, taking a deep and liberal interest in all local institutions,—Sabbath schools, churches, education, etc.,—and does good on every hand. In politics, though not a politician in the ordinary sense, he has been extremely active, and was regarded as one of the leaders of the old Whig and Home Industry party. He has been frequently summoned to Washington, for consultation on matters affecting the politico-industrial interests of the nation, and, while there, has been intimate with most of the prominent Statesmen and several of our Presidents. He is a powerful Methodist preacher, an attractive lecturer on temperance, a brilliant public speaker, and a warm friend of the colored population. He was married, in 1830, to a daughter of Daniel Rhein, of Reading, by whom he has had two sons and three daughters, two only of the latter still living.

WILLIAM McILVAIN & SONS' Rolling Mill, Reading, was originally erected by the senior partner, in 1856, and commenced operations in July, 1857. The amount of capital invested was $20,000. It is situated near the corner of Eighth and Neversink streets. The buildings now cover a space of about one and a half acres. The article manufactured is boiler plate, which is solely used in the construction of boilers for stationary and locomotive engines and steamers. During the first year, only about twenty-five hands were employed, and up to July, 1858, there were produced 338 tons nett. From this time, the amount manufactured steadily increased, and in April, 1862, they commenced working "double turn," so that the quantity turned out at the close of the fiscal year of 1862 showed a very considerable advance; the actual average of the first five years of operating was very nearly 800 tons per annum. During the period embraced between July, 1862, and July, 1867, (this included three years of the Rebellion, when the demand for boiler plate had grown to immense proportions,) the average per annum was a trifle in excess of 2240 tons: and during the five years ending in July, 1872, although the average yield per annum did not quite attain the last mentioned figures, yet for the year ending in July, 1872, the amount manufactured reached 2764 tons nett. The present capacity of the mill may be stated at 3000 tons nett, while the present force is about 115 hands. They have the capacity of rolling sheets 74 inches wide, and from the thickness of

one inch down to No. 16 wire gauge. In the year 1864, the firm erected a charcoal forge at Duncannon, Pennsylvania, on the Susquehanna river, which continues in full operation. This is used for the production of the best boiler iron, such as is especially designed to be used in the construction of locomotive boilers. It was in July, 1862, that the senior partner associated his two sons, Morton C. and William R. McIlvain, in partnership with him. They attribute their great success in business operations to the superior quality of the iron, especially that produced at their charcoal forge.

WILLIAM McILVAIN was born in Delaware county, Pennsylvania, July 1st, 1807, and was educated in that neighborhood. He worked on his father's farm until he became of age, when he commenced quarrying in the neighborhood. In 1836, he went to Berks county, to superintend certain iron mines, where he remained ten years. In 1846, he purchased an interest in the Gibraltar Iron Works of Simon Seyfert, and for ten years was a member of the firm of Seyfert, McIlvain & Co. In 1856, he disposed of his interest to H. A. Seyfert, and commenced the erection of the rolling mill described above.

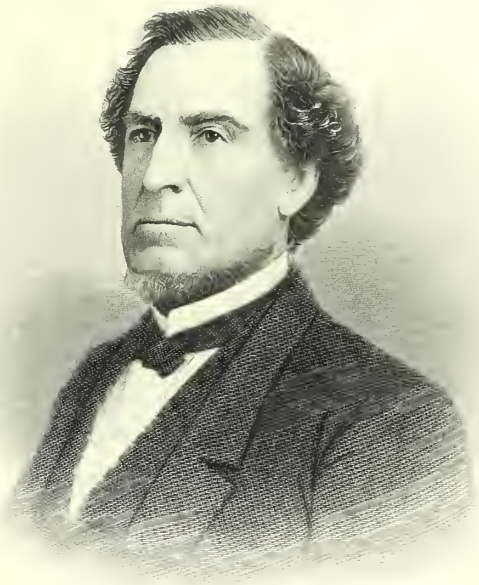
MORTON CROSBY McILVAIN was born September 27th, 1837, at Jones' Mines, Berks county, Pennsylvania; became a pupil at the "Rock School House," near the homestead, and after his father removed to Reading attended the public school. In 1857, he was employed by his father as a clerk in the rolling mill, and in July, 1862, became a member of the firm.

WILLIAM ROBERTSON McILVAIN was born January 28th, 1841, at the same locality, and received the same education as did his brother. He also was admitted into partnership with his father in July, 1862. He is at present the President of the Board of Water Commission of Reading, Pennsylvania, and Treasurer of the South Reading Market House Company.

THE NORTH PHILADELPHIA FURNITURE, MARBLE AND BEDDING MANUFACTORY, Philadelphia, is located at the corner of Frankford avenue and Ruan street, and extends along the latter to Thomas street. A large additional building used as a mattrass factory is located on Thomas street below Ruan.

It was founded, in 1864, by Samuel Cooper, who started with three hands, and continued the business, enlarging from time to time until January 1st, 1871, when he associated with him John Hall, under the firm name of Cooper & Hall. By the force of their doubled energies the works have advanced with still more rapid strides. On the 6th of April, 1872, the furniture and marble factory was entirely destroyed by fire, but in twenty-two days from that date they had erected a new building, 82 by 34 feet, four stories in height, with basement, and were again in operation. They also erected at the same time a new one-story building, 80 by 34, and during the present season (1873) will erect another large additional building. The mattrass factory is 200 by 100 feet. They employ over one hundred hands male and female, to whom they pay over $1100 per week. They produce from 15,000 to 20,000 mattrasses and beds; about 30,000 feet of marble; 13,000 marble-top tables; and 16,000 lounges per annum. They consume between 300,000 and 400,000 yards of ticking per year, and in the same length of time, over 1,000,000 feet of walnut, poplar and pine lumber, with 22,000 yards of reps, terries, hair cloth, etc. The products of this firm are justly celebrated far and wide, and an article of especial merit is a new patent bed lounge, which is complete, elegant and luxurious. Their extension table, as novel as it is convenient, has won, by its own merit, an enviable reputation, while the superiority and reliability of all their goods insure them a sale at all times commensurate with their capacity. The works have been advanced to their present proportions by the sheer force of the inherent energy, honor and candor of the members of the firm.

THE WEST READING MACHINE AND PIPE WORKS, conducted by the firm of Mellerts & Kinsey, owe their origin to John Mellert, who, in 1848, commenced a stove foundry, and assisted by four of his sons carried it on successfully, adding thereto the casting of iron water-pipes. A machine shop was shortly after added, with Arnold Mellert and Thomas L. Addison as the firm (Addison & Mellert) in charge, and mill-work was the specialty here. In 1863, Mr. Addison retired, and Thomas P. Kinsey, at that time the superintendent of the mechanical department of the Schuylkill Navigation Company, took his place, the firm becoming Mellert & Kinsey, and increasing the facilities of the shop for work, constructing passenger, freight and coal cars, building machinery for rolling mills, and other heavy works. In 1864, John Mellert re-



Benj. Hanyerwood

tired from active participation, and handed the works over to three of his sons, the machine shop being at the same time merged, and the firm reorganized under its present style, being composed of the brothers Arnold, Magnus, and Otto Mellert, and Thomas P. Kinsey. The car business not proving as profitable as was expected, was abandoned, the machinery sold, and the premises converted into a boiler works, which were successfully operated for two years. In the meantime, it had been determined to make the manufacture of gas and water pipes a specialty, and to that end the first pit for casting pipes vertically in dry sand moulds—a modern practice—was put in operation in 1867. The success was so great, that the works were extended in 1869, and a second pit built; in 1871 a third pit was added. Various changes were made at this time in the locale of the various buildings. During the past year the pipe foundry has turned out over 4000 tons of pipes varying in diameter from 3 to 24 inches; while the general foundry has cast in the same period over 1000 tons of special castings for gas and water works, rolling, grist, and other mill machines, railings, columns, etc. The machine shop is now principally engaged in keeping up the stock of flasks, patterns, etc., required for the pipe foundry, and in connection therewith manufactures fire-hydrants, stop valves, and general machine work. The entire establishment throughout is fitted up with a view to rapidity of construction, and economy in production; steam being made to take the place of hand labor wherever applicable. The buildings occupy considerable space, and are themselves replete with every conceivable adjunct necessary to handle and move the ponderous castings fabricated. At the south-west corner of Second and Chestnut streets, a space 63 by 109 feet is used for a flask yard, storage, and setting up of ore washers, of which many are made yearly. At the south-east corner of the same streets is a brick pattern store house, 70 by 100 feet, two stories high, containing the patterns accumulated for twenty-five years. On the north-east corner is the general foundry, 45 by 137 feet, 20 feet under the beam, with its cranes, drying ovens, and one of McKenzie's cupolas. The smith shop on Second street is 30 by 50, two stories high; the upper part being used for storage of railings and cellar grates, of which a good stock is always on hand. The machine shop, also on Second street, built of stone, is 62 by 90 feet, and 30 feet high throughout, containing the usual lathes, drill presses, planers, etc.; the pattern shop is in the second story, 62 by 30 feet, containing lathes and saws. There is also an engine room, containing a steam engine which drives all the machinery throughout. The pipe foundry is L shaped, 75 and 242 by 50 feet wide, and 22 feet under the beams, fully supplied with everything requisite in the casting and finishing of iron pipes. There is also a lot, 112 by 150 feet, where the pipes are tested at a pressure of 250 to 300 pounds per square inch. The boilers are here to supply steam for the engine, and to operate the pumps, etc., besides for the purposes of warming the buildings in winter. The works are in immediate connection with the Berks County Railroad, and also with the Philadelphia & Reading Railroad by a switch. The canal is at the foot of Chestnut street, rendering transportation of the products of their works very easy, by rail or water, to all parts of the country. The average force employed is 140 men and boys, 5 mules and one horse.

ARNOLD MELLERT was born in the Grand Duchy of Baden, June 24th, 1824. Emigrated to Reading in 1837, where he was educated. Learned the trade of a locksmith with his father, and subsequently entered the foundry, where he still remains. Has, at two different times, represented his district in the City Councils.

MAGNUS MELLERT was born in the same locality in September, 1827. Emigrated to Reading when quite young, learned the trade of a tinsmith, and afterwards joined his father in the foundry, taking charge of the moulding department.

OTTO MELLERT was also born in the same place, March 5th, 1832, and was five years of age when he arrived in America. Learned the moulding business, and after his father's death joined his brothers in the foundry.

THOMAS P. KINSEY was born in Easton, Pennsylvania, June 3d, 1832, and was educated there. First entered a hardware store, and afterwards a machine shop and pattern maker's, all in Easton. After serving an apprenticeship, he went to Reading in 1841, and worked as journeyman until 1850, then removed to Scranton, Pennsylvania, where he took charge of the new shops of the Delaware, Lackawanna & Western Railroad; there he remained till 1854, and became manager of the constructing department. Returned to Reading in 1857; was appointed superintendent of constructions of the Schuylkill Navigation Company, and, in 1863, first became interested in the foundry, as above related.

THE POINT PLEASANT IRON AND BRASS FOUNDRY, Philadelphia, James T. Bradshaw, proprietor, located on Beach street near Laurel, has a front of 120 feet each, on Beach street and Delaware avenue, with a uniform depth of 220 feet. It was founded in 1809 by Charles Park, by whom it was operated as a bell foundry, and for the manufacture of brass castings for vessels. After the expiration of some fifteen years, he associated with him Arundius Tiers under the firm name of Park & Tiers. They erected a large additional building for an iron foundry, and after a few years abandoned brass work and devoted themselves exclusively to that in iron. After the death of Charles Park (about 1840) the works were operated by Arundius Tiers alone until January 1st, 1861, when the place was purchased by his son, William H. Tiers. He continued to be the sole proprietor until July 1st, 1864, when he associated with him James T. Bradshaw, under the style of Tiers & Bradshaw. William H. Tiers died on September 30th, 1865, but his estate retained his interest in the establishment until July 1st, 1869, when James T. Bradshaw became the sole proprietor. The works employ an average of fifty hands, and manufacture general castings, principally for rolling mills and vessels. A large portion of the business is the making of gear wheels, for which they have the largest assortment of patterns in the United States. They produce about 1000 tons of castings per annum, in which they consume about 1500 tons of iron and 500 tons of coal.

JAMES T. BRADSHAW, the son of William K. Bradshaw, was born in Philadelphia, June 28th, 1829. After attending the public schools of Philadelphia, he became, in the latter part of 1841, an apprentice to watchmaking with John Black on South street above Second. Having grown dissatisfied with his occupation, he was apprenticed to I. P. Morris & Co., iron founders and steam engine builders, at Sixteenth and Market streets, September 25th, 1845. After he attained his majority, June 28th, 1850, he continued to work for them as a journeyman until May 1st, 1851. He subsequently spent brief periods in the same capacity in New York, Portsmouth, Virginia, Richmond and Baltimore, obtaining an insight into the management of various leading establishments. He became foreman in George W. Snyder's foundry at Pottsville, Pennsylvania, January 31st, 1853, where he remained until July 31st, 1856, when he returned to the foundry of I. P. Morris & Co. He continued as their foreman until he purchased, July 1st, 1864, one-half interest in the Point Pleasant Foundry. He served in the State Militia during the Gettysburg campaign, and has been for many years a member of the Union League, but has never aspired to political honors.

THE OLD LEHIGH HYDRAULIC CEMENT WORKS, General James L. Selfridge, Proprietor, are located at Siegfried's Bridge, on the Lehigh canal, about eighteen miles below Mauch Chunk, Pennsylvania. Together with the quarries from which the cement rock is procured, they were first operated by the Lehigh Coal and Navigation Company, and the cement so produced was chiefly used by them in the construction and repairs of their canal. For a period of over thirty years they remained under the exclusive control of this company, when, in September, 1872, they were leased to the present proprietor for a period of ten years, and under his management have been materially improved and increased. There are two quarries in connection with the works, one in their immediate neighborhood, and the other at about a mile's distance, that supply the rock which is afterwards manufactured into cement. The stone is believed to be the best on the American Continent, and has been carefully analyzed by Professor Chandler, of the Lehigh University, who has pronounced it to be "similar in composition to the celebrated English Portland cements." Although the capacity of the works has been largely increased within the past year, it is found almost impossible to supply the demand, over 100,000 barrels being ordered ahead. Everything is systematized. After the stone is quarried it is removed to the kilns for the purposes of roasting. There are five kilns, two of the capacity of 200 barrels each, and three, each accommodating 600 barrels. Here layer after layer of the substances is added, as the fire successively makes its appearance at the top, until the kiln is full. After the roasting operation is finished, the crude cement is loaded upon small cars, and carried on a plane directly to the mill, where it is dumped into the crusher, and thence conveyed into the hoppers of the millstones below, where it is thoroughly ground. There are four millstones now running, which produce twenty barrels each per hour. The motive power is supplied by a turbine water-wheel of eighty-five horse capacity, the Lehigh canal furnishing the water. Through the proximity of the canal to the works, the cement is loaded on the boats from the platform of the warehouse, and,

Jas. L Scofield

with the aid of a derrick, two men can place 600 barrels in a boat in a few hours. The buildings of the establishment have recently been materially increased. They now include a large cooper shop, store, warehouses, mills, and complete sheds over all the kilns. The barrels are manufactured on the premises, from staves brought from Ohio and White Haven, and hoop-poles from the Blue Mountains. The number of barrels manufactured average about 600 per day. Every department of the concern is operated with the utmost regularity, in order to economize time and labor. This cement has long sustained an excellent local reputation, and has been largely used in railroad, canal, and other constructions of the neighboring district. It has lately been attracting considerable notice abroad, accompanied with an increasing demand in the nearer cities.

JAMES L. SELFRIDGE was born in Berks county, Pennsylvania, September 22d, 1824, and, having received a liberal education, studied law for one year, which he relinquished to accept the position of Agent of the Lehigh Transportation Company. He subsequently effected an engagement as clerk in the commission house of Perot & Hoffman, Philadelphia, and, in 1852, went into business on his own account in the same city, where he remained until 1857. He then removed to Bethlehem, Pennsylvania, opening an office for the purchase and sale of real estate, and sale of coal on commission. At the outbreak of the Rebellion, he was among the first to volunteer, and served in the field for the entire war. For a year after he was mustered out, he filled the post of Assessor of Internal Revenue for the Eleventh District, and, in January, 1868, was elected Chief Clerk of the House of Representatives of the Pennsylvania Legislature, and has been re-elected each successive year. In September, 1872, he leased these works, as above stated.

JAMES S. MASON, Manufacturer and Merchant, of Philadelphia, was born in Lancashire, England, in 1811. At an early age he was bound apprentice to a letter press printer. When eighteen years old, he was released from his apprenticeship, left England, and commenced to work for himself in Philadelphia, at his trade. His father was a thoughtful and somewhat eccentric man, and having devised a peculiar kind of blacking, was accustomed to make it and give it away, merely for the interest he took in the preservation of leather. His son, taking a more practical view of the matter, commenced its manufacture and sale in a small way, in Philadelphia, in 1831. A printer himself, he made its merits known by printing numerous hand-bills, etc., which he would paste up himself in the evening, after the day's work was over. In his business he laid down for his guidance several maxims, to which he rigidly adhered. One was, never to buy on credit, but invariably to pay cash; a second, always to allow full compensation for damaged goods; a third, never to permit one of his employés to go home on Saturday night without his full wages. That success, if slow, would be certain under these principles, no one will doubt; and from this small beginning his manufacture has risen to be the largest of its kind in the United States, and is known throughout the civilized world. Judicious investments in real estate have added to his financial stability, and the firm now embraces his eldest son, who has been trained in the thorough business principles which have guided the house to its present position of prosperity.

SAMUEL CROFT, Sheet Brass and German Silver Manufacturer, was born in Birmingham, England, in 1808. He emigrated to this country in 1819. After engaging in various kinds of employment, he proceeded to Waterbury, Connecticut, where he entered a button manufacturing establishment. In 1832, he removed to Philadelphia, where he commenced the manufacture of gilt buttons. This business he discontinued in 1845, when, with a capital of $20,000, he embarked in his present enterprise. He built a rolling mill in Lower Merion, Montgomery county, and began the production of sheet brass and German silver, with the rolling of zinc plates. By dint of capable management and enterprising business spirit, accompanied with a determination to produce satisfactory work, the transactions of the concern have steadily enlarged, requiring a constant augmentation of capital, so that the amount at present involved in its conduct is over one hundred thousand dollars. Large quantities of old brass, lead and copper, of all kinds, are purchased by the proprietor, who, for this purpose, maintains an establishment at No. 528 Cherry street, Philadelphia. His operations, though large, are confined exclusively to Philadelphia, in which city he has won a wide reputation and high standing as a business man and citizen.

DAVIS M. LANE, Carriage Builder, was born in Delaware county, Pennsylvania, August 22d, 1827. He received his education at a common country school, and, until he reached his seventeenth year, labored upon the farm of his father, William Lane, who was a natural mechanic. His great-grandfather was the first coppersmith that ever worked in Philadelphia, and had his shop on the present site of the Bank of North America. Having no taste for agriculture, he became an apprentice, in 1843, to the carriage blacksmithing, with his brothers, John and Edward, doing business as E. Lane & Co. They removed to Philadelphia about the year 1846, and opened the first Philadelphia carriage factory west of the Schuylkill, on a portion of the site now occupied by the Pennsylvania Railroad Depots. After the expiration of his five years' apprenticeship, he worked as a journeyman with his brothers until the death of his father, in 1850, when, with a brother, he purchased, April 1st, 1850, the interest of E. Lane & Co., Edward removing to Baltimore and John to California. Lane & Bro. had continued the business but a short time, when Charles S. died, and the present proprietor was left to continue it alone. John, having returned from California, became associated with him, May 1st, 1851, as Lane & Bro., and they removed, in 1852, to 3406 Market street, where they began to make great improvements in the styles of carriages, and to compete with the oldest established houses. They opened a "repository" at 1907 Market street, in 1853, and the following year removed their factory to a capacious building they had erected in the rear of their salesrooms. By availing themselves of every improvement, the employment of the most skilful labor and the use of the finest materials, they steadily built up an excellent reputation. The financial troubles of 1856 checked their progress, and, in November of that year, D. M. Lane withdrew to commence business in Chester, where he remained until August, 1857, when he sold out and removed to St. Louis, intending to open a factory there. The field proving unfavorable, he returned to Philadelphia, and, after the collapse of prices, abnormally inflated, toward the close of 1857 reopened the works at 3406 Market street. Year by year his business increased until the spring of 1861, when, at the breaking out of the war, he suffered a heavy loss on the large stock on hand, by reason of the sudden fall in prices. Being an ardent supporter of the Union, he raised a company of one hundred men, and was mustered in July 5th, 1861, as Captain of Company B, 29th Pennsylvania Volunteers (Colonel Murphy). He left his business in charge of an efficient superintendent; but soon finding that it must have his own personal supervision or be sacrificed, he resigned, September 19th, 1862, two days after the battle of Antietam, and returned home. In those dark days, however, his services could not be wholly spared, and he was appointed, March 25th, 1863, Provost Marshal of the Fourth District, in which capacity he served until October 1st, 1865. After the close of the war, his business so largely increased that, in 1867, it became necessary to extend his capacity, and he purchased the present site and erected the handsome three story brick buildings, with 80 feet front and 105 feet depth. All the sawing, planing and mill work is done elsewhere, and about forty men are employed in the construction of pleasure carriages, of which they manufacture about 125 per annum, besides a large amount of repairing of fine carriages. They construct a great variety of first-class vehicles, from 125 pounds weight to the heaviest coach, and it is a standing rule to guarantee every carriage. He was married, October 11th, 1849, to a daughter of Jonathan Dixey, a prominent builder of Philadelphia, and has six children.

THE FRANKFORD CHEMICAL WORKS, owned and conducted by Savage, Keyser & Stovell, are located on Orthodox street, at its crossing of Frankford creek, Philadelphia. The grounds embrace over six acres, on which are erected extensive and substantial stone buildings, well adapted to their specific design. The front on Pierce street, some 400 feet in length, is occupied by the main building, three stories high, offices, storage-shed, stables, etc., while the rear abuts on the creek, which is substantially wharfed, and has the necessary derricks and other appliances for loading and discharging vessels. The intermediate portion of the lot is occupied by large buildings, 100 feet square, used for the manufacture of muriatic and nitric acids and their compounds, besides storage room for coal, etc. The production of sulphuric acid (or oil of vitriol) is the main business of the establishment, about 100 carboys (of 160 pounds each) being produced daily. The crude brimstone is wheeled into a building 50 feet square, and 30 feet high, to the open ventilator roof. There are here ten furnaces, with iron doors, which are at short and regular intervals charged with sulphur, the fumes or vapor being carried by pipes to the main building, 200 feet long and 60 feet wide,

containing great leaden tanks or "chambers," into which the vapors are conducted and condensed, flowing into another building, where the fluid is received in huge leaden vats (with furnaces underlying), whence it descends from one vat to another, at regularly decreasing levels, until it enters the final retort, which is of platinum, 5 feet in diameter and 6 feet high, with projecting arm and syphon, all of the same costly material, which is employed because of its insensibility to the action of corrosive substances. In these processes, the greater portion of the water of condensation is expelled, and thereby the acid is brought up to the commercial strength of 66 degrees Beaumé. From the syphon it is drawn off into earthenware receivers, passing from the nearest to the farthest by an ingenious arrangement of glass syphons. Arriving at the last receiver, it is drawn off into the carboys, weighed, marked, capped, and made ready for market. There is an ingenious contrivance for returning to the chambers certain weak acid condensed in the worm attached to the platinum retort. The floor under the chamber room is for storage, and has the capacity of safely keeping 10,000 carboys. The firm also manufactures tin crystals, and all other dye stuffs. A visitor is profoundly impressed with the air of quiet which pervades this establishment, and finds it difficult to comprehend how such heavy productions can be accomplished with so little noise and confusion. Every detail of the business is under the direct supervision of the firm, subordinates being trusted with nothing but the manual labor. The establishment was founded by Christopher Weisner, 1829–'30, and the works were originally located on Kensington avenue above Harrowgate. Various changes were made in the firms who have operated these works, by the association and subsequent retirement of parties who were interested therein. The present firm was created February 1st, 1870, when these works went into operation, and the old site was abandoned.

JOHN R. SAVAGE was born in Philadelphia, May 9th, 1828, and is a son of John Savage, formerly of Jamaica, West Indies. He was educated at the Military Academy of Captain Alden Partridge, at Bristol, Pennsylvania, and, after leaving school, became clerk at the Conemaugh Iron Works, in Westmoreland county, Pennsylvania. He returned to Philadelphia in 1850, and engaged as clerk with George W. Geisse, at the Frankford Chemical Works, which he leased, December 1st, 1854, and formed the firm of John R. Savage & Co. He was elected to Common Council from the Twenty-third Ward, where he served with ability and credit.

BENJAMIN U. KEYSER is the youngest son of Elhanan W. Keyser, and was born in Philadelphia, August 22d, 1832. He was educated in the public schools, and graduated at the High School, February, 1850. In April of the same year, he became an assistant in the United States Coast Survey, whence he was transferred, two years later, to the Light House Service, where he remained till September, 1869. During the greater part of that period, he was Chief Clerk of the Board, and, during the war, Acting Secretary and Executive Officer.

FREDERICK STOVELL, eldest son of Thomas B. Stovell, was born in Philadelphia, August 7th, 1842. He received his education in the public schools, and, in August, 1857, entered the counting house of E. A. Souder & Co., leaving it to become a partner of the present firm, February 1st, 1870.

WILLIAM MANN, Blank Book Manufacturer, Philadelphia.—The large establishment conducted by this manufacturer was started in 1848, and is among the most complete in the United States. It supplies regularly 900 banks and bankers, and has a steady custom from Maine to Texas, and from Pennsylvania to San Francisco. The present building, in Market street, was formerly occupied by Hood, Boubright & Co., as a large dry goods house. It was purchased by William Mann, at a cost of $125,000, and he moved into it in the spring of 1872. The alterations cost $25,000, and the bills for fixtures, machinery, etc., amounted to about $75,000. The clear value of the premises, fixtures and machinery, is estimated at $225,000. The machinery consists of twenty printing presses, adapted to every description of commercial printing—such as blank books, bill heads, cards, etc.—eight ruling machines, and seven paging and numbering machines, all of which are of the latest improvements. The fifth floor is the ruling department, where the fine various colored lines and cross lines of ponderous ledgers are accurately and beautifully marked out by the most skilful mechanical processes. The fourth floor is the bindery, and, like every other floor, has its foreman in direct communication with the proprietor. This binding has, from the weight of many of the books, to be necessarily very solid and strong, and great care is

exercised in this particular as well as in the outside finish. The third floor is occupied as printing and composing rooms; for the house does a large amount of printing for many of the prominent railroads of the country, where time-tables are wanted, clearly and accurately printed, and furnished at the shortest notice. This is the most difficult kind of proof reading, and, as some of the employés have been in the establishment for nearly twenty years, they have thus become very rapid and proficient workers. The second story is occupied as a stock and sewing room. Some eighteen girls are here employed for the sewing and various operations preliminary to binding. Very careful supervision is given to this work, so that no defects may be covered up. The retail salesroom occupies the first floor, and in this are various articles, such as bankers' cases and wallets, writing and copying inks, pocket books and porte monnaies, Mann's celebrated gold and steel pens, counting house calendars, copying presses, bank note presses and cancelling machines, portfolios, travelling bags, dressing cases, with blank books and writing paper in almost endless variety. One hundred and fifty hands are employed in the establishment, and, to convey some idea as to the extent of the business done, it may be mentioned that 6,000,000 checks were printed in 1872 for different banking houses. There is also a superior quality of copying paper manufactured at this establishment, of which the proprietor is the designer and patentee, susceptible of being written on with a pen, as well as capable of being used for transferring. It is considered the best article in the trade, and the sales of this article alone have amounted to $150,000 per annum.

WILLIAM MANN is a native of Philadelphia, and his business career illustrates what ability can achieve when combined with energetic resolution, indefatigable industry, steady, earnest application, and square, open-handed dealing. In 1848, his only stock consisted of a carpet bag, from which blank books were peddled from door to door throughout the city. These being promptly paid for as soon as they were sold, inspired considerable confidence in the vendors, and procured him a credit for thirty days. His next step was the purchase of a horse and wagon, at an outlay of $125. His son, Joseph H. Mann, now the chief manager, tells how he used to assist his father in selling from the wagon, and when there was snow, his sled was attached behind, on which he used to ride. By the force of his skill, enterprise, energy and integrity, alone, has he raised himself to the high commercial and social position he now occupies.

THE FRANKFORD BOILER WORKS, Philadelphia, occupy the former site of the blacksmith shop of S. D. Sidebotham, on Frankford avenue, near the Frankford creek, which was established in 1855. This establishment was continued until April, 1868, when S. D. Sidebotham and John Powell associated in partnership under the firm name of Sidebotham & Powell, and, having erected the necessary additional buildings, engaged in the manufacture of boilers, tanks, forgings, pipes, engines, and all kinds of machinery, devoting especial attention to boilers. They have recently been making a specialty of the manufacture of steam engines, all kinds of tubular, flue and cylinder boilers, and steam and water pipes, with all the necessary fittings. Being in close proximity to a large number of manufacturing establishments, the bulk of their work consists of repairing. They consumed, during the past year, boiler iron beyond the value of $3682; bar iron to the amount of $800; $400 worth of rivets and bolts; $3500 worth of castings; $2600 worth of pipe and fittings; while they have paid out for labor over $12,155. Their work is superior in the quality of the material and the skill of its workmanship; they have fairly earned the high reputation they enjoy.

ADAM GROSS & CO.'S Pork Packing and Curing House, Philadelphia, was founded in 1846, by Christian and William D. Gross, elder brothers of the present proprietors, and commission dealers at the Union Stock Yard. The establishment is situated at the corner of Thirty-ninth and Elm streets, and is unsurpassed for location, cleanliness and ventilation. The special business here engaged in is the slaughtering of hogs and curing of meat. The trade at present is mostly local, some lots, however, being shipped to the West Indies. Under the management of the original proprietors, about 200 hogs and thirty cattle were slaughtered weekly, considerable business being done in those days with Southern ports and the West Indies. After they had materially increased their business, in which they were very successful, although at the outset they possessed but a very small capital, the first proprietors, in 1863, transferred the establishment to the three younger brothers, who had for fifteen years previous been their assistants in their business. The present firm is now constituted by the three brothers, Adam, George and Hermann. Connected with the slaughtering and packing house

are the ice houses. Their capacious cellars are mostly hewn out of the solid rock, and, on the premises, they have a fine never-failing well of the purest water, that is almost constantly in use for the various purposes about the establishment, which requires at all times a plentiful supply. There are also four large smoke houses; an improved set of machinery for preparing sausage meat; a steam engine to furnish the motive power required; in fact, all the usual accessories of a first-class house of this description. In addition, they occupy a large storehouse on Story street.

CHRISTIAN and WILLIAM D. GROSS came to America when twenty-one and nineteen years of age respectively. They each found employment, though the wages paid them at first were small. They subsequently started in business together, on their own account, and kept but one purse, from which each one drew as he had necessity. This they have continued, with slight exception, to the present time. The younger brothers, who emigrated at a later day, worked as their assistants for fifteen years, without any settled compensation, drawing from the funds sufficient to meet their wants. At the end of this period of service, they were invited by their two elder brothers to a family feast, and were there presented with a deed for the packing house, buildings and stock, of which they at once assumed control. Of course, nothing but the kindliest feeling and true harmony could prevail in such a family; and, with industry and thrift, success, under such circumstances, is sure. The brothers, in the midst of their successful career, have not forgotten their families, but have provided fine residences, adorned in a tasteful manner and conveniently arranged, while ample grounds afford space for a surrounding of beautiful and attractive gardens.

THOMAS MILES & SON, Boot and Shoe Manufacturers, Philadelphia.—This firm may lay claim to being classed as one of the oldest in the State. It was founded under somewhat humble circumstances, in the year 1818, and since that period has met with the most signal success. Originally the firm occupied a small two storied house in South Fourth street, where it is said the illustrious Franklin first became acquainted with his wife; but, on the rapid increase of the business, the three adjoining buildings were afterwards occupied. Commencing with a capital of five or six hundred dollars and an employ of five workmen, the firm now have a capital sufficiently large to extend the business to an almost indefinite extent. Before the introduction of machinery into the establishment, they employed from 350 to 400 workmen, and between 50 and 60 workwomen. At the present time, there are 200 men and 40 women employed. These manufacture, in the course of a week, 350 pairs of shoes and gaiters, and 2600 pairs of men's, women's and children's boots. The goods produced are all of the finest description, and their great demand throughout the State is chiefly owing to the reputation of their elaborate finishing, which reflects the most varied skill and efficient workmanship on the part of the workers. Until the year 1861, the firm engaged in a large trade with the South, but, since the termination of the war, this business has been from various causes materially reduced, and at the present time there is but one agency, at New Orleans. They also had a branch at San Francisco, which has been discontinued. During the early years of the war, the house entered into a contract with the Government to furnish 100,000 knapsacks, and by this means many of the workmen were kept together, thus partially staving off the evils that subsequently befel so many hundreds of manufacturers. Notwithstanding this, however, the losses occasioned by the war amounted to $60,000. But since peace was restored to the Union, the house has made most rapid progress, and, at the present moment, its credit stands as high, and public confidence is as fully assured of its trustworthiness, stability and honor, as at any previous period of its history.

JACOB MILES, the founder of the house, was born in Philadelphia county, on October 9th, 1791, and is still living (1873), being in the eighty-second year of his age. His father was a plough maker of some celebrity, and was held in high estimation throughout the neighborhood. Jacob was educated at a country school, and seems to have gone through the various mechanical branches of his education with marked approval. Contrary to the wishes of his father, who had intended him for a successor to his own business, he expressed a strong desire to enter the boot trade, and, in 1816, commenced at a small store in Second street. In 1818, he founded the present firm, the success of which is due to his unwearied industry and perseverance in the early years of its history. In 1863, he retired, leaving the business in the hands of his son, who entered the house in 1839.

THOMAS MILES, the present head of the firm, was born in Philadelphia, in the year 1818,

and entered into business at twenty-one years of age. He shortly afterwards married, and a son of this marriage is now in partnership with him.

HYLA H. PEACOCK, Manufacturer of Fancy Cases, Philadelphia. This house was established in 1850. It is the largest establishment in the city engaged in the manufacture of morocco cases. The productions include jewel caskets, writing cases, plate chests, surgeons' and physicians' cases, fancy book racks, etc. One of the specialties of the factory is inlaid wood work, in which line this house leads the trade. A noteworthy specimen of this style is their "game box," in which are contained the materials for backgammon, cards, dominos, chess, dice, cribbage, etc. This is made in a most costly manner—one description being valued as high as $250. In this class of goods the house is one of the most prominent in the country, and supplies most of the high-class jewellers in the Union. The number of hands employed is about twenty. The raw material consumed includes from 15,000 to 20,000 feet of lumber of all kinds, including pine, poplar, walnut, maple, cherry, rosewood, satinwood, tulip wood, ebony—which is very extensively used in the work—white holly, etc. Of leather—chiefly morocco—about 1500 skins are required per annum. About 2000 yards of satin and velvet, together with binders' cloth, and several bales of wadding, are also yearly used, besides large quantities of hardware for locks, hinges, and ornamentation. For these latter purposes brass is chiefly employed. The house received a silver medal at the Franklin Institute Fair of 1874.

THE SCHUYLKILL COPPER WORKS, opened by Wheatley & Harvey, were established in October, 1872, to attempt the smelting of copper by the old Swansea process. The results so far have been highly satisfactory. The ores used are exclusively from Pennsylvania, being obtained from Jones' Mines on the Wilmington and Reading Railroad; from the Cornwall Iron Ore Mines, in Lebanon county; from the French Creek Mine, in Chester county, and from several mines near Pottstown, Montgomery county. The average as put into the furnace is about 9 per cent. of copper, dry assay, and in the first process the result is about 90 per cent. slag (which itself contains rather less than 1 per cent. copper and which is rejected), and the balance, a rich "malt," containing sulphuret of copper and iron, assaying from 30 to 40 per cent. of copper. This is again charged in the furnace, and a white metal obtained still richer in copper. A third time it is melted, and a blue metal is the result, yielding about 70 per cent. copper, 6 per cent. iron, and 20 per cent. sulphur. The fourth process converts this into regulus, and the fifth into blistered copper. The latter is from 95 to 98 per cent. of pure copper. The final process is termed "refining or toughening," and brings the metal to a marketable condition. The copper is cast into ingots, which as soon as they are consolidated in the moulds are thrown into water, which gives them a slight film of suboxide, which adds to the beauty of their appearance. If allowed to remain too long exposed to the air before being plunged into water, they are coated with a scale of black oxide, which makes them rough and unsightly. Since these works were first purchased, the old roasting furnace used by the former owners has been demolished, and in its place a splendid ore furnace erected. The regular monthly yield with this furnace has been about 12,000 to 15,000 pounds of ingot copper, which is A No. 1, the head smelter, Thomas Reese, having no superior as a copper smelter in this country. It can be used for any purpose for which this metal is required, as wire, bolts, sheets, etc., etc. Their sales commenced in December, 1872, and so far they have disposed of some 120,000 pounds, valued at over $30,000. The proprietors are about erecting a new furnace, by which they will be enabled to double their present product.

CHARLES MOORE WHEATLEY was born in England, March 16th, 1822, and was brought by his father when a child to this country. He was educated in New York, where he also began life in a mercantile house, and remained at this employment till 1846, when he became manager of the Bristol Copper Mine in Connecticut. In 1848–9 he was manager of the Perkiomen Copper Mine, Pennsylvania; from 1850 to 1857 general manager and part owner of the Wheatley Silver Lead Mines, discovered and opened by him in Chester county, Pennsylvania. He also has engaged in mining on his own account both in Pennsylvania and California. He is a great mineralogist, geologist, conchologist and explorer; and has collected thousands of specimens, most of which are very rare and of priceless value.

ZEIGLER BROTHERS, Boot Manufacturers, Philadelphia. This large and well-known house was established in January, 1869, under the joint co-operation of Henry, George, William and Lewis Zeigler. They mastered the principles of their art at an early age, the two elder brothers becoming master mechanics in the ladies' branch of the business, and rising, after considerable practice as journeymen, to the position of foremen in the house of Zeigler & Sutton, in which house they were also joined by their two younger brothers. Acquiring a thorough practical knowledge of every detail connected with the trade, perceiving the general drift of its demands, possessing the needful capacity to supply them, and ambitious to open a business for themselves, they started an establishment, on a limited capital, at 216 Market street, which at once met with great success. The object of the house was to place in the market a class of goods superior to any hitherto manufactured, possessing the advantageous elements of style, quality and cheapness, besides being specially adapted to meet the demands of the Southern trade. By the manufacture of such goods the house directly gained an extensive reputation, the sales increasing every month, and the orders coming in so rapidly as to necessitate the occupation of larger premises. This resulted in the removal of the firm to 14 North Fourth street, in July, 1870. Six months previously they were joined by their eldest brother, John J. Zeigler, who furnished additional capital, and gave a quickening impulse to the whole business by the renewed exercise of the abilities and energy that had so signally distinguished his former conduct in the trade as senior partner in the house of Zeigler & Sutton. Under such favorable auspices the new firm made rapid progress, their business became largely increased, and such is now the inquiry for their goods that, were it not for the limited room at their command, fully twice the number would have to be manfactured to supply the demand. The house gives employment to two hundred and twenty-five operatives, who manufacture weekly over four thousand pairs of ladies', misses', and children's boots. As evidence of the magnitude of the business it may be mentioned that it has increased to four times that of the first year. The trade is chiefly confined to the South, South-west and Pennsylvania.

JOHN J. ZEIGLER was born and educated in Chester county, and commenced working the business with his father at the early age of eleven. He continued working at home until he attained his majority, and then, with the exception of a short time spent in the retail business, engaged exclusively in journey work until 1860. In that year he entered into partnership with Mr. Sutton, and started a business on a limited capital. Being joined by his four younger brothers, the house made rapid progress, and the business was worked to a very successful and prosperous issue. In October, 1868, he retired, and during the next fifteen months engaged in no active occupation. Meanwhile his brothers had started a new establishment, which became the origin of the present house of Zeigler Brothers.

THE NATIONAL FURNITURE MANUFACTORY, Philadelphia, was founded by the present proprietor, John A. Ebert. After his first arrival in the United States, he worked as a journeyman for three years, and then started in business on his own account, in a humble way. His manufactory was located in an attic, and at first he was its sole tenant. In the course of time he added an assistant, and soon after the services of a second were needed. While here, he made a fine sofa, which he placed at the (1854) Exhibition of the Franklin Institute; it soon after brought forth its fruits in the shape of an order from an Arch street resident for a suit of furniture of his own design, for which he received $2100 cash, and an order for a second. With this money he established himself on Callowhill above Sixth street as manufacturer and dealer, increasing his force of journeymen to six. In less than six months' time the premises proved inadequate, as he had found it necessary to treble his working assistants. He removed to Second below New street, where his business continued steadily to increase until 1857, when the financial distress and consequent dull times almost proved his ruin. He, however, retained his men, and manufactured furniture to be sold at auction, but the auctioneer having failed in his business, he was urged to turn his attention to that calling himself, which he did, and held his sales to the highest bidder, twice each week. Nor did he confine himself exclusively to furniture, but sold everything that was consigned to him, and so was able to keep his workmen employed. A short time previous to this he had taken a partner into his business, renting a large factory. In 1858, he removed to a finer store on Second street below Callowhill, and three years later occupied a building a short distance further down the street, where he remained three years

more. He then withdrew from the auction business, and having dissolved partnership commenced the wholesale manufacturing business in the factory which he still occupies on Edward street. Here he had only a small space at first, but finally he became the sole occupant, and has since purchased the building. The factory covers an irregular piece of ground, and is L shaped, 56 feet front, 74 feet rear, and 150 feet deep, (a view of it is presented in the steel engraving opposite). There is also a building 24 by 40 feet, used for finishing and drying. The principal factory structure is four stories high, and the rear one three stories. An eighty horse power engine drives all the machinery. The lumber yard is in the angle of the L, and contains both kiln and sun-dried lumber, the latter being preferred when obtainable. On the first floor are the warerooms; on the second, the cabinet shop; on the third, the machinery. All the modern appliances, and all the different processes of manufacture are here carried on, including upholstery; and the care and personal attention at every step, as well as the taste and skill of the proprietor in designing and executing, have been, from the first order for the parlor suit to the present time, the elements of success. A splendid store at No. 331 North Second street is occupied by him for the retail trade.

JOHN A. EBERT was born in Wurtemberg, Germany, in 1820, and was left an orphan at ten years of age, since which time he has supported himself. He received a common school education, and was originally apprenticed to a shoemaker, but forsook this trade for cabinet making. He served a four years' apprenticeship, and had worked for two years as journeyman cabinet maker, when, by his age, he became liable to the military duties imposed by the laws of his country. He managed to escape across the Rhine, and thence worked his way to America *via* England. The rest is told above.

THE GLOBE DYE AND BLEACH WORKS are located at the corner of Oxford and Worth streets, Frankford, Philadelphia. They were established in 1867, when entirely new buildings were erected by Richard Greenwood and William Bault, under the firm name of R. Greenwood & Bault; the same firm had been in business on Canal street in Kensington. The works are fine brick structures, and consist of a front building 70 by 40 feet, in connection with which there is a dye house 150 by 40 feet, besides many other additions. Upon the corner is another building 85 by 35 feet, three stories in height, the two upper floors of which are rented with power to weavers, who run between sixty and seventy looms. They also own the fine block known as the Steadfast Mills, occupied by J. Culbert, situated on Worth street, above Oxford, which rank among the most extensive establishments in the manufacture of cotton cloths. The machine shop adjoining, occupied by Denn & Griscom, also belongs to this firm. They use five steam engines in their dye and bleach works, to which steam is supplied by seven boilers, arranged in two sets, which can be connected or disconnected at pleasure, and they have all other necessary machinery of the most improved patterns. Their operations employ seventy-five hands, and they dye or bleach about ten thousand pounds of yarn per day. A steam pump is in constant readiness for use in case of fire, which is also a necessary auxiliary in the supply of water for the dyeing operations, and, therefore, must be always in order. The hose from the carriage may be attached in a few moments and run to any part of the establishment by a single watchman. The dry house is so arranged that fire may be extinguished by steam from the boilers beneath. The work is all carried on under the personal supervision of the members of the firm, who are men of large practical experience, having devoted their whole lives to this and kindred branches of industry. It is not surprising then that their business, under their energetic and able management, has steadily increased until they rank among the very best establishments of their class.

RICHARD GREENWOOD was born in England, September 1st, 1821. He is a son of Richard Greenwood, who was a hand-loom weaver in his native country. The family came to the United States, in 1827, and settled in Philadelphia, where young Richard was educated in public schools. At the age of twelve years, he entered the print works owned by Samuel Pilling and others, at Frankford, and subsequently became an employé in the mills of John Briggs & Co., where he gained a full knowledge of the dyeing business, and rose to the position of foreman in his department. He afterward engaged as foreman in the dye house of R. Garsed & Brother, at the Wingohocking Mills, and remained there until he associated in partnership with William Bault, in August, 1865.

WILLIAM BAULT, a son of Thomas Bault, was born August 29th, 1828, in Philadelphia. He

Wm Baird

was educated in the public schools, which he left at the age of twelve, and for a few years labored upon a farm. On reaching seventeen he became an apprentice in the machine shop of R. Garsed & Brother, and served the full time of four years, remaining in their employ during a period of twenty-two years, for eleven of which he was their engineer. He associated in business with Richard Greenwood, in August, 1865, and became the financial partner of the firm.

THE LANARK MILLS are situated at Frankford, Philadelphia, and take their name from the mills of Robert Owen, the great manufacturer and philanthropist, of Lanark, Scotland. They were built in 1864, by William Baird, who had been running the old Aramingo Mills, the property of James Brooks, since 1856. He continued to operate the Lanark Mills until the spring of 1872, when he rented them to Morris R. Stroud & Son, who conduct the business at the present time. The Lanark buildings are a handsome pile, with frontage on Frankford avenue, and also on Green street. The one fronting on Frankford avenue is four stories in height, with French roof, the first floor being devoted to offices, committee rooms, banqueting room, etc., while the other three floors are occupied as lodge rooms with the necessary ante-rooms, the main apartments being 41 by 42 feet. Each one of these is furnished expensively and beautifully and contains a fine organ, while the Masonic lodge room on the fourth floor is particularly elegant in all its appointments. The princely liberality of Mr. Baird has erected, and, to a great extent, furnished this beautiful building for these benevolent societies, which are allowed to occupy them free of rent. The building on Green street is called Baird's Hall, and contains on the first floor saloons, bath-rooms, steam heating apparatus, etc., while in the second story is a fine audience chamber, capable of seating 1200 persons, with fine stage, necessary dressing rooms, etc. There is in this auditorium an excellent grand piano of Hallet & Davis' for use in concerts and other entertainments. The arrangements for ventilation are most complete, while in case of fire or accident there are three modes of egress, and the room could be emptied in less than five minutes. The factory building proper is five stories in height, the lower story being occupied as a finishing room, while the second, third, and fourth each contains fifty-two looms; the fifth story is used for beaming and twisting, and contains a large water tank. Beside all these there are store houses, spooling and winding rooms, boiler house, engine house, and an iron-clad fire proof house for the reception of waste, which is cleared from the factory three times per day. The buildings are heated throughout by steam, and the true philanthropy of the owner has prompted him to spare no expense to add to the comfort and convenience of the employés. Every floor is furnished with pure water, stationary washstands, retiring rooms, etc. It is altogether a weaving establishment, the spinning and dyeing having been relinquished long ago. The products are checks, ginghams, osnaburgs, and a general line of cotton goods. The mills employ about 120 hands, and turn out about 6500 yards of cloth per day.

THE MONTGOMERY OIL WORKS, Norristown, Slemmer Brothers, Proprietors, were originated by Jacob C. William, Dr. Henry T. and Charles Slemmer, sons of the Hon. Adam Slemmer, editor of the *Norristown Register*. The erection of the buildings was commenced in the fall of 1861, and they were ready for occupancy in May following. The brothers had, for some time, been extensively engaged in oil mining operations, in the vicinity of Titusville, and had made experiments in refining the oil, previously to the erection of the present factory. In 1864, they disposed of their entire mining interests, directing their attention, exclusively, to the preparation of the oil for market. The qualities manufactured are gasoline, benzine, illuminating oil, double refined lubricating oil, spindle oil, axle oil, car grease, and paraffine. Their illuminating oils are all of a high grade, much being "head-light oil" of at least 170 degrees fire test, and are considered perfectly safe; during the twelve years of their operations, no accident has been known to happen with any manufactured by them. Their machine oils enjoy a wide reputation, and, of these, they have constantly on hand thousands of barrels. The outside appearance of the works is unpretending; but the interior, displaying a vast array of machinery, tanks, etc., indicates the magnitude of the business carried on. They comprise six separate buildings, chiefly filled with tanks, the majority of which hold 200 barrels each. The refining is effected by means of a steam engine and two iron stills, capable of refining 200 barrels a week. They have, furthermore, an abundant supply of pure spring water, derived from reservoirs constructed for the purpose. At the

close of an extended litigation terminating in 1868, Dr. H. T. Slemmer retired from the firm, leaving the other brothers in possession of the works. The business has grown, from small beginnings, until it has attained its present proportions, which are very large, as the firm have constantly on hand from 3000 to 4000 barrels of oil, about one-half ready for market, and the rest in process of manufacture. At the commencement of the business, the oil was transported in barrels from the wells, and carted from the depot to the works; but now it is brought direct in tank-cars, containing ninety barrels each, and by means of a pumping apparatus, is easily transferred from the cars to the receptacles provided to await the process of refining. The three brothers may constantly be seen at the works, aiding, by their own labor, in the operations of refining, etc., and to this constant supervision and personal attention to the details of the business, combined with the superior quality of their lubricating and illuminating oils, is to be ascribed the success they have achieved. They were all educated as practical printers, in their father's office, in Norristown, and had achieved distinction in that branch of art before commencing their mining and refining operations.

BESSEMER STEEL CURVE WORKS, Philadelphia, William Wharton, Jr., Proprietor, were founded by him in August, 1870, in West Philadelphia, and removed to their present location, at Washington avenue and Twenty-fifth street, in January, 1873. They were established for the manufacture of Bessemer Steel Grooved Rails for Curves, for either steam or horse railways, turn-tables, railway frogs and switches. The buildings and storing accommodation occupy a space of about two acres, the main structure being 50 by 100 feet, with engine house, boiler room, blacksmith shop and other buildings adjoining. A large space is devoted to laying out work, which must be perfectly fitted on the ground, before being shipped to its destination. The manufactory constantly employs, at this time, twenty-five hands. A steam engine of forty horse power is used for bending rails. The manufacture of these rails has proved a great success, on account of their superiority over those formerly made of cast iron, arising out of their greater endurance under the especial strain on curves, as compared with the straight rail, and the lesser degree of friction; since, by their use, the friction of car wheels in turning the curves is greatly reduced—a most important item among their many advantages. Moreover, the facility with which they can be sprung into irregular shapes, has recommended them greatly to railroad corporations, as well abroad as in this country. The market for them is, of course, everywhere on this continent, supplies having been furnished, since their introduction, to almost every large city of both North and South America, for the use of horse railways. The greatest care is necessary in their manufacture, as it is entirely novel, and every operation must be made *de novo*, no experience having been had in the past. In preparing material, each rail is carefully numbered when desired, and a plan furnished with the work. Nearly all the curves now being laid for use by the street railways of America are from this establishment, and supersede the former cast iron curves. Curved rails are furnished here of the length of thirty feet, thus improving upon the use of the former short lengths, which necessarily made so many breaks. Two very powerful bending presses of an original construction are in use, operated by steam power, and capable of bending the largest rails while cold, no rails being heated here in preparation for curves. Absolute exactness in calculating the radii is necessary, and the greatest care is required in bending the rails, that they may fit exactly in their place when laid. They also manufacture turn-tables, specially designed to economize space and cost of the construction of long tracks at termini of street railways; also rail systems, for obviating the necessity for using large numbers of frogs at the termini of double track railways. The material used is readily transferred from one part of the works to another by a railway track of eighteen inches gauge. Order and system, as well as the greatest exactness, characterize the work.

THE GLEN-RIDDLE MILLS, operated by Samuel Riddle, Sr., Harry Riddle and Samuel R. McDowell, members of the firm of Samuel Riddle, Son & Co., were originally established in 1842, by the senior partner. Previous to this date, he had commenced, in 1827, in a rented building, at Springfield, Delaware county, the spinning of cotton yarns, with 480 mule spindles, employing ten hands. In three years' time, he removed to a larger building on Chester creek, and commenced operations with 3000 mule spindles, and all the necessary machinery used in preparation, and he remained here prosperously engaged for twelve years. In 1842, he purchased the present site, on which there have been

KEYSTONE WORKS.

Henry Disston & Son. Saw. Tool. Steel & File Works. Philada.

LAUREL STREET VIEW

Yours Truly
Henry Winston

erected from time to time five mills, which are employed in the manufacture of cotton and woollen goods. The locality is well chosen. A beautiful valley on Chester creek, about fifteen miles from Philadelphia, has been selected, where the senior partner owns a tract of land embracing 280 acres, worth $300 per acre. There are about 200 dwellings in the town, occupied principally by the operatives, of whom there are upwards of 500 employed in the mills; the town, post-office and railway station derive their name, as do also the mills, from their projector. The Philadelphia & Baltimore Central, and Philadelphia & West Chester Railroads traverse the estate. The mills operate nearly 10,400 cotton and woollen spindles, with all the machinery used in the preparatory work, and 270 power looms. They are propelled by one 52 turbine water-wheel, of 16 feet head; one overshot of 22 feet head, and one Corliss steam engine of 500 horse power. The goods manufactured here are tickings, stripe and plaid shirtings, cottonades, Canton flannels, brown drills, Wyoming sheetings, and tricot, cotton and Kentucky jeans, which are widely known and justly celebrated throughout the country for their superiority over the common manufacture. There is probably no finer water-power in the country, and no site more eligibly or more beautifully located for manufacturing purposes, than that selected for these mills. Here the business has been prosecuted for upwards of thirty years, with constantly increasing prosperity, as the demand for the goods manufactured augments from year to year.

SAMUEL RIDDLE was born in the township of Parkmount, county Antrim, Ireland—two and a half miles from Belfast—in the year 1800. He acquired a fair English education in a private academy, quitting it at fourteen years of age to enter a cotton factory in Belfast. There he acquired a practical knowledge of the art of cotton manufacture, during the nine years he was thus occupied. He then determined to seek a more profitable field, and sailed for the United States in May, 1823, but was shipwrecked at Sable Island. He eventually reached Philadelphia in the following August, his whole capital being now reduced to four Spanish dollars. He immediately obtained work in a cotton factory at Manayunk, but was shortly seized with fever and ague. He removed to Pleasant Mills, New Jersey, where he was similarly employed for about three years. During this time, by carefulness and thrift, he had accumulated a small amount of means, with which he commenced business on his own account, as hereinbefore stated.

SAMUEL R. McDOWELL was born in Crozerville, Delaware county, Pennsylvania, February 11th, 1837. He remained at school until he was thirteen years old, when he entered the Glen-Riddle Mills, to obtain some knowledge of the business, where he remained three years, and then was in his father's store for a year, after which he went to an academy near Rochester, New York, and passed a considerable time in his studies. On his return home, he again assisted his father in the store. From 1857 to 1859, he taught school, and afterwards acted as clerk for James Riddle, a brother of Samuel, who was engaged in the manufacture of cotton goods, near Wilmington, Delaware, with whom he remained eight years, and during the last five years had the general management of the business. On January 1st, 1867, he entered into partnership with Samuel Riddle, and has entire charge of the sales and purchasing departments, for the duties of which he is most eminently fitted.

HARRY RIDDLE was born in 1851, and has received a fine literary education, beside a thorough training in the Military Polytechnic School. When but eighteen or nineteen years of age, he had the general charge of the factory. He was admitted into the firm March 11th, 1872.

HENRY DISSTON & SONS' Saw Manufactory, Philadelphia.—This extensive establishment,—the largest saw manufactory in the world,—owes its origin to the energy, enterprise and skill of the senior partner, who commenced the business about the year 1843. The first saws made in Philadelphia were manufactured by Mr. Rowland, who, prior to the Revolution, erected his forge in a tent, in the suburbs of the city. His saws, however, were only partially composed of steel. He was followed, in 1820, by Aaron Nichols, who produced a better article, and shortly afterwards the firm with whom Henry Disston learned his trade (Lindley, Johnson & Whitecraft) was established. He remained with them till he was twenty-two, when, owing to a misunderstanding with Mr. Johnson, he left them, declaring to his employers that he would establish an opposition factory in their immediate vicinity. This he effected as soon as possible, commencing operations by building his furnace with his own hands. Too poor to buy a ton of coal, he borrowed a wheelbarrow and wheeled his fuel from the wharf, at Front and Willow streets, to his shop, at the corner of Second and Arch streets. He began

business with a capital of $350. He took his first lot of saws from the furnace with mingled feelings of hope and despondency. They represented his whole capital, and he estimated them as being worth about $400. This capital had been obtained by his savings, as a journeyman, in the employment of the above named firm. While working at his trade, he learned not only the manufacture of saws, but also how to make the tools and machinery necessary to their production. This thorough knowledge of his business contributed largely to his future success. The amount of work he turned out the first year is not known; but, at the end of three years, he found himself no richer than when he started. In the meantime, his former employer had found himself compelled to apply to him for saws, which he furnished. The difficulty he experienced in introducing his articles into the market was extreme; he had to overcome a vast amount of prejudice against American saws, and was obliged to spend three days in the week in soliciting orders, employing the other three in their execution, as at that time he had no assistant; and, on Saturday night, he carried his saws to the respective purchasers. Matters continued thus till 1844, when he was induced by a stranger (Mr. H.) to occupy part of a building which the latter professed to have bought, and which possessed the advantage of having steam power. In order to effect this change, he borrowed $200, with which he fitted up the shop and established the first steam saw factory in the country. The immediate result of this new venture was a bitter disappointment; for, Mr. H., who had leased and not purchased the property, attempted to slip away with his goods during the night, but was prevented by his fellow occupant, who informed the proprietor of what was taking place. That gentleman at once repaired to the place, prevented the removal of the goods, and placed the matter in the hands of the sheriff; Mr. Disston's property was seized for back rent, and he was furthermore notified by the landlord that he would be compelled to make good any deficiency that might arise. His goods were sold, and he was under the necessity of borrowing money to extricate himself from the new misfortune. This trouble was the precursor of others, which, though temporarily distressing, tended eventually towards the improvement of his affairs. Mrs. Disston was at this time laboring under a severe illness, and her husband had no money, but calculated that in three or four days he could finish a lot of saws and sell them, thus placing himself once more in funds; but the physician peremptorily forbade any noise being made on the premises, thus, of necessity, putting a stop to the finishing of the saws. His wife died, and he found himself penniless, under the most trying circumstances. He was able to borrow five dollars from an old friend, Dr. Thomas Ingraham, and, with this sum in his pocket, went back to his work with a heavy heart. From this time forward his career was marked by prosperity, varied only occasionally by disasters, that but brought his energy more fully into play. A new landlord coming into possession of the property, and seeing the good order and apparent prosperity of the shop, doubled the rent. This proceeding induced the tenant to move once more, and rent the premises at Third and Arch streets, which he occupied for two years, when he was again turned out, the property being held in trust for the Paul Beck estate. He then moved to the site of his present works, as tenant under William H. Miles, a machinist, who rented him a shop and steam power. Here he had been installed but a few months when the boiler, belonging to his landlord, burst, and the building was burned down. These repeated annoyances disgusted him with renting, and he determined to be the owner of his own shop. For this purpose, he bought a lot, about 60 feet distant from his former location, and in fifteen days had a factory in working order upon it. This miniature workshop, occupying an area of 20 square yards, formed the nucleus of the present establishment. His ambition then was to run twenty anvils—at that time an unprecedented number. In 1848, he introduced another improvement, by utilizing the waste from the imported sheet steel, which he resolved to convert into a cheap article for coarse work, thinking that, in so doing, he might find the means of making a better article. The result proved highly successful, the steel thus produced being found as good as that imported. Again he encountered the opposition due to prejudice, but again triumphed, the demand for steel thus made having steadily increased to the present time. The severe financial crisis of 1857, which overwhelmed so many business houses, found him prepared to meet it, and he was able to weather the storm without damage to his credit or resources. Shortly after this period, the outbreak of the civil war, in 1861, became a new source of danger. He believed that this fresh trouble would put a temporary stop to the manufacture of saws; and, in common with most business men in the North, was anxious to lend the Government every aid in his power. Being highly patriotic, and indignant at the action of the South, he would cheerfully have led all his men to the war had he not hit upon a better plan. He proposed to the Government agents to make

swords, cavalry bits, guns, bullets and any other article which might prove serviceable. This offer was accepted, and he immediately commenced the manufacture of such goods as were needed, at the same time continuing to carry on his saw factory, as it appeared that the United States would require as many saws as he had been in the habit of making; but he invariably gave the preference to Government orders. He also sent twenty-five men to the army, paying their wages and keeping their positions open during their absence. The incidents of the war resulted in a still further development of his business. The depredations of the rebel cruisers pointed to the advisability of producing iron plates at home, and induced him to establish a rolling mill, which he effected in 1862. Two years later, a fresh disaster befell him, which, however, as usual, only prepared the way for future extension of his premises and business. Intelligence reached him in the night that his works were destroyed by fire. After coolly asking for a cup of coffee, he deliberately walked to the spot, and found the men standing ruefully looking at the ruins, supposing there would be no further need of their services. He at once assured them they would be more busy than ever, and ordered them to commence clearing away the rubbish. This they did, the bricks being still hot, while the proprietor walked off to purchase all the sail cloth he could find. All the rival concerns predicted a suspension of work for at least six months; but, in ten days after the fire, the works were again in operation. As fast as a place was cleared, an awning was spread over it, machinery erected and steam power introduced from one of the uninjured buildings. He also enlarged his premises by buying an adjoining lot: thus, while previously to the fire, the monthly amount of work produced was $33,000, it was doubled after that event. The firm no longer limit their manufacture to saws, but make many other articles in steel. They ship their goods to all parts of the United States, to England, Ireland, Austria, Germany, Russia and Australia. As an instance of the esteem in which the Disston saws are held in England, we quote the following from the Philadelphia *Press* of September th, 1873: "The saws of the great establishment of Henry Disston & Sons, of this city, have long since won a European celebrity, and are now steadily supplied to foreign manufacturers. The following extract from a letter to that firm, dated London, September 6th, 1873, covering an order from Holloway & Co., Minories, London, explains itself, and is more expressive when we remember the boasted superiority of England in all branches of tools and cutlery: 'We are happy to tell you that your saws are far superior to any that we can obtain of English manufacturers.'" The firm have agencies in London, San Francisco and Chicago, and, in the latter city, they have recently established a factory, which will tend to relieve the Philadelphia works. After the disastrous fire in Chicago, in 1871, all the hands in the Philadelphia works agreed to give one day's wages for the relief of the sufferers. The head of the house went to that city to personally investigate his affairs; and, while regarding the ruins of his agents' office, he was called upon by a customer with an order for four saws. He promised to deliver them the following day; but, as none of these in stock were available, he was obliged to make them himself, this being the first instance of a steel saw being manufactured in Chicago. The demand for the Disston saw is constantly in advance of the supply, although the firm at the present time employs a force of 700 hands, and is running 200 anvils on premises which cover eight acres of ground. The monthly value of the work produced by this vast concern is $125,000, or, $1,500,000 annually. To meet the steady increase of business, it is proposed to still further enlarge the capacity of the factory, and to this end a property has been purchased at the corner of Market and Randolph streets, at a cost of $110,000. This eminent success may be ascribed chiefly to the complete knowledge possessed by the founder of the establishment of saw making in all its details; to the superior quality of the article supplied, and, in some degree, to a judicious system of advertising. Though, as before stated, making various articles in steel, their specialty is still the manufacture of saws, and their excellence in this branch enables them to defy competition.

HENRY DISSTON is a native of England, being born at Tewkesbury, in 1821. His father, Thomas Disston, after giving up his business, in 1824, started for London; but, on reaching Nottingham, met with a friend, who induced him to engage in the manufacture of lace machines. He afterwards removed to Derby, where he instructed his son in his business, and also in the general principles of mechanics, a knowledge of which proved so useful to him in after years. Henry was subsequently placed with a dry goods merchant, at Crumford, where he remained but a short time, and returned to his father. His father, not succeeding in his business, emigrated to America, accompanied by his son and daughter. After a tedious voyage of sixty days, they landed at Philadelphia, where, three days afterwards, the father

was attacked by apoplexy and died, leaving his children to the care of a friend. A situation was soon found for the daughter, but there was more difficulty in the case of the son. At length, however, he was employed by the firm of Lindley, Johnson & Whitcraft, where he learned his trade. About 1844, he was married to Amanda Bickley, who left him no children. He was married a second time, to Mary, daughter of Jonas Stillman, of Egg Harbor, New Jersey. Two of his sons by this marriage, Hamilton and Albert, are associated with him in business; the former of these accompanied the quota of men sent from his father's works to the war, and, though offered promotion, refused it. He is a member of the St. George's Society, of the Masonic Order, and the Oxford Presbyterian Church, which his gifts largely aided in founding. He is a considerate employer, and has given shares in his business to all the valuable men in his employ, in addition to their salaries. In appreciation of his uniform kindness, his employés tendered him a banquet on his return from Europe, in 1856, and also presented him with a handsome service of silver, in 1871. His son, Hamilton, was also the recipient of a splendid gold watch, valued at $600, as a gift from the men. He annually sets aside many thousand dollars for charitable purposes, and has also established a kind of private dispensary, where all the poor in the vicinity can obtain medicines, gratis. In short, few men have been more successful than he has, and none more deservedly so.

THE LEBANON FURNACES, owned and operated by the Hon. G. Dawson Coleman, were originally erected in 1846, by the present proprietor and his brother (who retired from the partnership in 1852), and are located at North Lebanon, in Lebanon county. When the first furnace was erected, the enterprise was considered hazardous; as, until that period, no one had attempted to manufacture iron from the "Cornwall ore" with anthracite coal. But the proprietors were sanguine of success, for they were watchful, well-informed and untiring in their endeavors; moreover, they were able to command a supply of the finest ore in the country. Their hazardous experiment was attended with perfect success, insomuch that, in 1848, another furnace was added, and the quantity manufactured was doubled. In 1856, an experimental furnace was erected for the manufacture of iron with the cold blast, but it proved unsuccessful. These furnaces have recently been enlarged in their capacity; a new stack was built in 1872–'73, which, within a short time, has been "blown in." There are 200 men employed in these works, and three blast engines, of 200 horse power each, are used in connection with the furnaces. The amount of iron manufactured, when in full blast, is from 450 to 500 tons per week. The different works cover about forty acres of ground. The "Cornwall ore" only is used, and is procured from "the banks," at a distance of six miles. The product is mostly used for the manufacture of Bessemer steel, and large quantities are also purchased by the Cambria Iron Company. This ore is mined by a company, and the mines contain the finest deposit of this description in America. The proprietor of the Lebanon Furnaces is the president of the company, and a large stockholder in the same.

G. DAWSON COLEMAN was born in Philadelphia, Pennsylvania, January 13th, 1825. His parents and ancestors belonged to Lancaster county, and he is the fourth in descent to engage in the manufacture of iron, his father, grandfather and great-grandfather having all followed that calling: and three of these have furnished shot and shell for three wars,—the Revolution, the War of 1812, and the Rebellion. He was educated at Princeton and Philadelphia, graduating at the University of Pennsylvania, in 1843. He has been elected three times to the Legislature, twice to the Assembly, and once to the Senate, serving in the latter body from 1857 to the close of his term, in 1860. During the Rebellion, he contributed freely of his means to the cause of the Union, and aided very liberally in the equipment of the 93d Pennsylvania Regiment. He is prominent in doing good, and is a most valuable and estimable citizen. He is President of the First National Bank, of Lebanon. He is largely interested in the Pennsylvania Steel Company.

THE MOHAWK MILLS, Chester, are owned by Robert and George W. Hall, who compose the firm of Robert Hall & Son. The manufacture is of cotton and woollen jeans and doeskins, and the establishment is located at the corner of Third and Franklin streets, on a lot 142½ by 60 feet. The building was originally erected for a machine shop by John M. Broomall, and occupied by ——— Mulford. In 1858, Samuel Eccles, Jr., commenced here the manufacture of jeans, and continued the same until May 13th, 1871, when he sold the business

W. Dawson Coleman,

to Robert Hall. The present partnership dates from January 1st, 1872. The original building was 25 by 50 feet, and two and a half stories in height; to which Samuel Eccles, at different times, made additions, and also erected a building 50 by 37 feet, of two stories, for offices, etc., and Robert Hall, in 1872, still farther increased the capacity by building a structure 25 by 37 feet, also two stories high. The mills contain two sets of woollen cards, 48 by 42. There are thirty-six looms, double box; two mules, with 630 spindles; together with all the preparatory and finishing machinery indispensable to a well conducted establishment of this character. A steam engine of twenty-five horse power, of the combined Corliss and Green pattern, furnishes the motive power. There are also on the premises outbuildings used as dry-house, dye-house, etc. The cotton warps used here are purchased; but the firm spin all their woollen yarns for filling on the premises, and consume about 1800 pounds of stock every week, and nearly 4000 pounds of warp per month. The amount of goods manufactured averages 24,000 yards per month, of about 7¼ ounces to the yard. About thirty-three hands are employed on the premises. The goods are mostly shipped to New York, although some find a market in Philadelphia.

ROBERT HALL was born in Lancashire, England, November 29th 1816. His education was gained in the Sunday schools, for he was but eight years of age when he commenced to work in the mills. Here he thoroughly mastered the business. He emigrated to the United States in 1842, settled in Delaware county, Pennsylvania, and was an operative in various mills until 1863, when he went into business on his own account at Waterville, in that county, where he first engaged in spinning yarns, and subsequently manufactured woollen jeans exclusively. He continued there until his removal to Chester.

JOHN GRIFFEN, Engineer, Inventor, and Iron Master, was born in the township of Mamaroneck, Westchester county, New York, in 1812. He is the son of John Griffen, a farmer of the same place. He is one of the fifth generation, born in the same house, which is one of the oldest in the country. His early education was derived from his mother, a school teacher, who instructed him till the age of fourteen years, when he was sent to a Friends' school, at Nine Partners, in Dutchess county. On completing his education, he entered the store of an uncle, in New York, staying with him till he was twenty-one years old, when he engaged in business with another uncle. This occupation, however, being unsuited to his tastes, he travelled for some time in the West, and took a position as book-keeper, following that profession till the age of twenty-nine years, when, finding his health somewhat shaken, he came to Pennsylvania, and engaged as book-keeper at the iron works and nail manufactory of R. C. Nichols & Co., of Norristown. With them he remained three years, conducting the works during the latter portion of the time. He seemed now to have found his true sphere of action, as, while with that firm, the talent for engineering and mechanical pursuits, which subsequently made him so celebrated, found an opportunity for developing itself. His first attempt in that direction was the erection of the works of Moore Hooven, of the same place, which he was unexpectedly called upon to do. While so engaged, he conceived and successfully applied a novel method of economizing the cost of using steam power, by saving the waste steam lost under the old system, of nests of boilers, and thus enabling steam to compete with water power in point of economy, and consequently rendering it superior as a motor. He experienced much opposition in this matter; his theory was almost universally condemned, and his employers had nearly decided not to make the trial; but he overcame all obstacles, and his principle finally remained triumphant. Though the idea had been previously suggested, he can fairly claim the merit of being the first to successfully apply it. In 1847, he was commissioned to erect the works of Reeves, Abbott & Co., at Safe Harbor. The design of these works had already been furnished, and closely resembled that of the Phœnixville Iron Works; his duties were consequently chiefly of an executive character, but served, nevertheless, to strikingly display his abilities. He remained with that firm till 1856, and, while with them, introduced the governor for controlling steam engines used in rolling iron, a great desideratum, but theretofore supposed impracticable; and likewise machinery to run the carriage transporting the rail from the rolls to the saws, instead of employing hand labor. His well-known invention for making wrought iron cannon was also made here. It consists in winding rods, spirally and in several layers, around a central piece, in which is the bore, and then welding them between rollers, thus virtually making a twist gun, possessing great power of resistance. Experiments were made with these guns, by Government, and one of 620 pounds (regulation weight, 988 pounds,) was tried, which

only burst after 568 discharges. The charges and ammunition were gradually increased, the last three trials being with seven pounds of powder and thirteen balls, while the test for a bronze gun of the same calibre is two pounds of powder, one wad and one ball. Many hundreds of these guns, made by the Phœnixville Iron Company, and known as the Griffen gun, were used during the late war. He went to Phœnixville in 1856, to take charge of the works there, and remained till 1862. His next invention was for rolling the large wrought iron beams, used in buildings, on the small rollers then in use. He obtained a patent for this in 1857, and put it into successful operation. His process was a complete success, and has undergone no change whatever. Thousands of tons of these beams are now made annually, and for several years he rolled the largest beams rolled in the world, getting them up to 15 inches on rollers 19½ inches in diameter, while, by the old method, 9 inches was the maximum size obtained on larger rollers. He assigned all rights to this process, except that of employing it in any other mill with which he might be connected, to the Phœnix Iron Company. In 1862, he engaged to erect the Buffalo Union Iron Works, for a firm engaged in the general iron manufacture, and also in making the wrought iron beams, he having conceded to them his reserved right in consideration of a royalty. These rolling mills, although built in 1862, are still considered among the best in the country. In 1867, he again accepted the position of mechanical and civil engineer, and, eighteen months later, returned to Phœnixville, where he was placed in charge of the works, as superintendent. He is now (1874) engaged in erecting a new and large works for the same company. It is intended to be equal to any in the world, and will cover 6¾ acres, and is to be used for the finishing of iron. It will be the first mill in the world in which compound high and low pressure engines will be introduced. The general plan and the arrangement of the machinery are his own. He was elected Burgess in 1857, and served as School Director very efficiently. On accepting the latter office, he found the facilities afforded very insufficient, and set to work to remedy the defects, and in a short time obtained the construction of the fine new school-houses now in use. He designed and superintended their construction and had the schools graded. He was unanimously elected a second time, being the first man in the borough to receive that honor. He is one of the stockholders and a director of the Phœnix Iron Company, and also a member of the firm of Clark Reeves & Co., being one-fifth owner. A fine draughtsman and designer, he has designed many of the finest residences in Phœnixville. He was married, in 1837, to Esther, daughter of Reuben Leggett, of New York, by whom he had five children, only one of whom is living. His first wife died in 1849, and in 1851, he was espoused to her sister, by whom he has had five children, four of whom are living. His eldest son, Robert N., was in the United States Navy, and lost his life, by yellow fever, in the service of his country.

THOMAS THOMPSON, SONS & CO., Dealers in and Manufacturers of Upholstery Goods and Cabinet Findings, are located at No. 240 South Second street, Philadelphia. The senior partner of the present firm commenced the business in 1838, at No. 134 Dock street, and it was not only the first of its kind in the city, but also in the United States, to be exclusively devoted to this particular line. As its projector possessed all the qualities and characteristics of a thorough business man, he was determined to secure commercial success in the right way; and that success followed as the natural result of integrity, punctuality, diligence, and perseverance. The trade of the house was so constantly increasing as to demand increased accommodations, which were afforded by purchasing three contiguous properties on South Second street, Nos. 236, 238 and 240, and on this site he erected an elegant five storied brown stone edifice, which was built under his own supervision and direction, with a view of making it one of the most attractive and convenient establishments of the kind in the country. With respect to the trade, the location is central, and the structure, having a frontage on two streets, is admirably lighted throughout its whole extent. In the year 1862, he associated himself with his two sons, Thomas M. and Lewis A. Thompson, and also with Washington Nicholson,—the latter having been for many years practically identified with the business,—under the firm name of Thomas Thompson, Sons & Co. The younger members of this house have only become partners to add commercial strength to the establishment, as also a moral vigor to its well-earned reputation. The basement of the establishment is mainly used for the manufacture of springs, of which ten tons are fabricated every week. The first floor, which fronts on Second street, includes the counting room, which is the centre, from which radiate all the vast operations of the establishment. The business offices are fitted up in modern style, comprising separate sections for the members of the

Wm. A. Hendy

firm, cashier, book-keepers, and also for the accommodation of customers, and present an appearance of business, rather than ornament. The correspondence of the house not only embraces all parts of the United States, but a great portion of Europe; and there is scarcely any part of the civilized world where their goods are not sold or purchased, or where they have not correspondents. In Paris, the firm have a resident agent, who attends to the purchasing of all the newest designs and patterns which appear in the market, thereby giving the establishment an unequalled facility for supplying every novelty simultaneously with its appearance in the European market. It would occupy many pages to describe the very numerous articles which fill the shelves on the main floor alone, and are exhibited by the active corps of salesmen, who are occupied from morning till night in waiting on the numerous customers who throng the warehouse. It is sufficient to say, however, that, in addition to all the smaller articles that enter into the manufacture of cabinet ware, cars, carriages, and the undertaker's profession, there is an immense stock of upholstery goods, brocatelles, plushes, moquetts, reps, damasks, morcens and terry; in fact, it is questionable whether any other establishment of the kind can display so great a variety, quantity and quality of terry as can be found on the several floors of this extensive warehouse. In this connection, it should be observed, that the firm are the proprietors of the large mills on Howard street (below Diamond street), known as the "Philadelphia Rep and Terry Works," which, by the way, are the second largest in the Union. Heretofore, all these goods were imported, but at the present time, little in that line is done, as the American fabrics are finding their way all over the country. The principal causes of the great success that has attended this favorite house have been, as far as can be ascertained from authentic sources, the vending of reliable goods, that have proved to be such as represented in and by the pattern exhibited when sold, superior management in general matters, together with personal integrity of character and invariable politeness. As the firm make their entire purchases for cash, they possess an undoubted advantage over less fortunate houses; and can therefore dispose of their commodities on lower and more favorable terms than where the credit system is in vogue. For these reasons, the past and present high position of the house is not surprising. The constant care and attention with which they execute all orders entrusted to them, coupled with the great reputation they have always sustained for business integrity, have had the effect of extending their operations to all sections of the country, without exception, and their goods are as familiar to the people of California and Oregon, Minnesota, Missouri, Louisiana, Tennessee, etc., as they are to those in our midst. The large fortune, which has been the reward of their endeavors, has been, in a great measure, employed in turn for the benefit of the community in general, as the subscription lists of nearly all our first-class charities would abundantly attest. It is not too much to say, in conclusion, that this establishment, in its particular business, is second to no other in the extent and character of its trade, in the experience and practical ability of its members, in its age and importance, and its unsullied credit and respectability.

THOMAS THOMPSON was born in England, and emigrated to the United States, reaching Philadelphia March 11th, 1834. He was a marble mason by trade, and soon found employment, commencing on his own account, in a small way, his sole capital being his industry and perseverance. Shortly after he started, he rented a locality at the northeast corner of Green and Thirteenth streets, where he erected a workshop. In November, 1836, he associated his brother Lewis with him, the firm name being T. & L. Thompson, and their business became larger and larger as time rolled on. In 1842, they purchased a lot of ground at Ridge avenue and Thirteenth street, where, in 1845, they erected a spacious marble and mahogany saw mill, turning shop, etc., which, in May, 1848, was entirely destroyed by fire, the work of an incendiary. Nothing daunted by this unfortunate affair, they rebuilt their works, erecting larger and more complete buildings. Meanwhile, the other establishment—described above—had been successfully inaugurated, and as both the mill and warehouse were too much of a burden for the senior partner, the firm of T. & L. Thompson was dissolved, and the former devoted himself to his great warehouse, while his brother Lewis became the owner and operator of the mill.

WILLIAM A. HENTZ is a son of Jacob Hentz, a merchant of Philadelphia of high social and commercial standing, and who held at one time the office of Gauger under the State Government. William A. Hentz was born March 19th, 1837, and entered upon active life at an early age. He received his education in his native city of Philadelphia, and, upon its completion, he was apprenticed

to a mechanic in Germantown ; it being a cardinal point of the doctrine of life with his parents that every young man should possess the knowledge of some trade as an essential element of education. Having prepared him for the serious business of life by a good and sound education, supplemented by a trade, his parents left him to make his own way in the world by the diligent pursuit of his calling, and the beneficial results of such a discipline have been shown in the success which has throughout marked his career. The training which he had received in his earlier years was of especial service to him when, in the year 1860, he entered the well-known and long-established house of White & Hentz. The establishment is one which is venerable for its antiquity, since its first casks had been brought to the wharves in slow-sailing vessels and sent away to the interior in Conestoga wagons. This house gave him a splendid field for the exhibition of his business ability. He held at first the position of superintendent of the shi[illegible]ping department. In 1865, however, the senior partner withdrew from the firm, and William A. Hentz was admitted into the partnership under an agreement for three years, which was afterwards renewed for three years longer. This second contract expired at the close of the year 1870. He then withdrew from the firm and established himself on his own account in the same business, distilling, rectifying, importing and trading in liquors. In a few months he had succeeded in building up, by means of his capital and capacity—not by his credit, for he was accustomed to buy only for cash—first a local, and then a distant trade; rivalling that of many houses of note and long existence. Rapid as was the growth of his business, it was still not of an ephemeral character. The honorable dealing of the house and high and reliable quality of the goods kept explain its constantly increasing trade. The commercial position of the proprietor is the legitimate result of his previous arduous and zealous labor in the interest of his employers, and of his six years' partnership in the firm of White, Hentz & Co. On leaving the old firm, he took with him much valuable stock. To this he has since made important additions of the finest brands of wines and liquors, of which he is in constant receipt. Since the days when the establishment of White & Hentz was under the management of its first proprietor, Philip Wager, it has had a high reputation for whiskeys as a specialty. This reputation William A. Hentz has shared with them in his new establishment. The premises occupied are very extensive, and are four stories high. The stock has the widest range, including every possible kind of wine and spirit. The trade of the house is with all parts of the Union, extending from the State of New York to the Southern States. For an extended trade of this kind William A. Hentz is peculiarly fitted. In addition to his general commercial abilities, he has ever been distinguished especially as an incomparable travelling salesman. In this department he is unsurpassed. His tact and quickness of appreciation, together with his great determination, have enabled him, in all his innumerable journeys, to accomplish more than he could have previously hoped for, whether engaged on his own account or by others. He is a business man of the nineteenth century and thoroughly understands how to push trade. He makes quick sales to old customers and is constantly obtaining new ones. He has travelled greatly, and this trying career, which taxes so severely all the energies, seems to be his natural element, and has been the means of displaying his peculiar qualifications. He is intimately connected with many various orders, by the members of which he is highly esteemed. He is known beyond his immediate circle also for his kind and liberal generosity.

GIVERSON, MACRUM & CO., Manufacturers of Bar and Sheet Iron, Pittsburgh. The business was first commenced in 1845, and has since been successfully conducted, as is evidenced by the large amount of iron manufactured. The works are situated on the Monongahela river, near the upper bridge, Pittsburgh. Between three and four hundred hands are constantly employed, and the product annually ranges from six to eight thousand tons of bar and sheet iron. The most successful feature of their business is considered to be the very superior quality of the sheet iron manufactured.

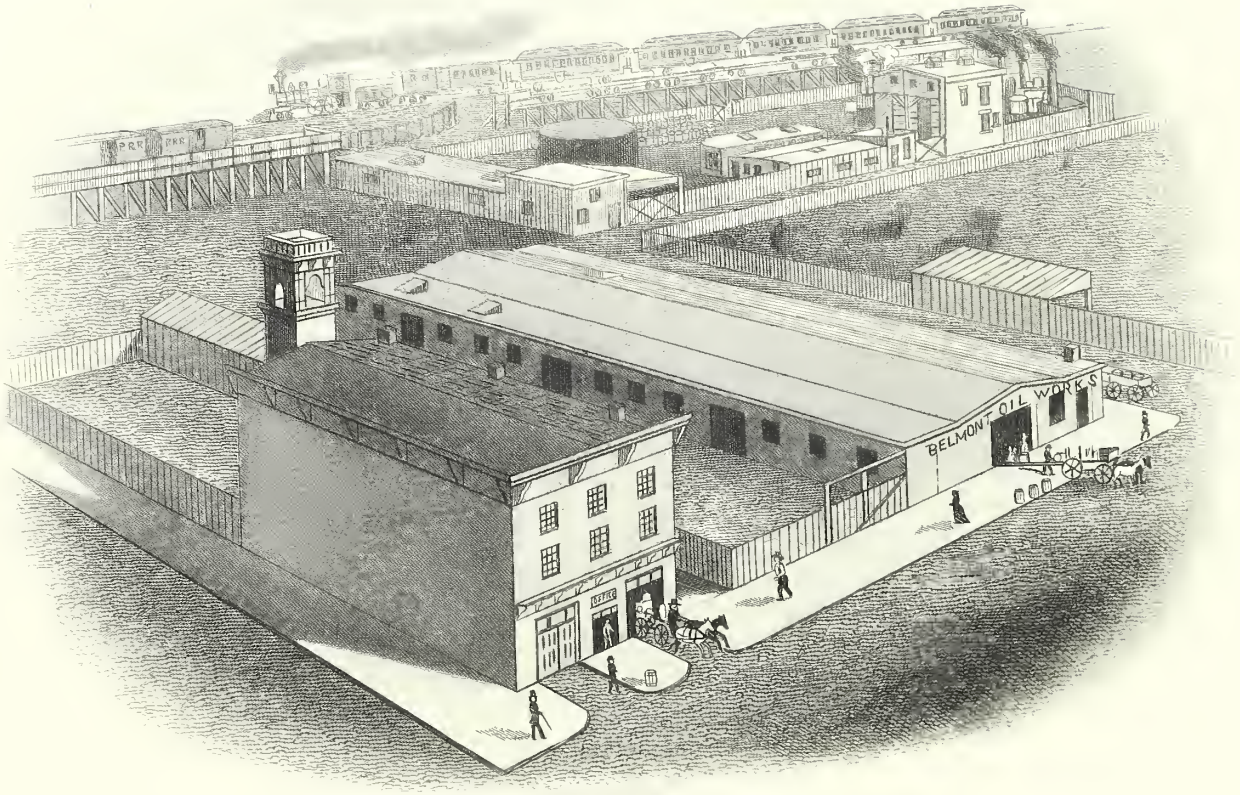
GEORGE WALTERS, Mechanical Engineer, is a native of Pikeland township, Chester county, Pennsylvania, where he was born, March 22d, 1810, and is a son of William and Catherine Walters. He was educated at the district schools, and at an early age was indentured as an apprentice to the coach making trade, at which he served until he attained his majority ; and then labored as a journeyman for a year or more. He subsequently went into business on his own account, having also erected his

Geo. Walters

own shops, etc. In 1838, he removed to Phœnixville, where he effected an engagement as pattern-maker and draughtsman to the firm of Reeves & Whitaker, and with them and their successors he has remained ever since, a period of over the third of a century. He has been regularly advanced through all the various grades of promotion, and is now the Chief Engineer and Chief Draughtsman, which title he has borne for over twenty-five years. The Phœnix Company's Works have been erected mainly according to his plans, and under his immediate supervision. The perfection and completeness of every detail in and about the various buildings bear ample witness to profound study and very marked ability. In 1844, he planned the blast furnaces at Havre de Grace, which were there erected by Reeves & Whitaker, they having chosen him as the engineer and designer of this improvement. It was here, and for the first time in the history of iron manufacture, that the gas was taken from the tunnel-head of the furnace and introduced for generating the steam and heating the blast, a process now so universally adopted. In the following year, under the direction of David Reeves, he designed the blast furnaces at Phœnixville, and superintended their erection. Here also the gas was successfully introduced under the boilers, and the hot blast for generating all the steam for the engines, and also for heating the blast for the furnaces. As these mills proved an entire success, he was selected by the principal proprietor of the Phœnix Works as the chief engineer, to plan, arrange and superintend the construction and erection of what was then known as the new Rail Mill. This work was commenced about May 1st, 1846, and, on the 16th of November following, all the furnaces, machinery and appliances necessary for the manufacture of railroad iron were completed, and rails successfully made. Immediately following this improvement, the firm of Reeves, Abbott & Co. selected him as the engineer to erect a large rail mill and blast furnace at Safe Harbor, Lancaster county, Pennsylvania; he made all the plans and drawings necessary for executing the work. In the same year, also, Reeves, Nichols & Co., of Bridgeton, New Jersey, commenced the erection of a large rolling mill, in addition to the other works which they were successfully operating; this new project was generally planned and arranged by him, and the work fully completed to their entire satisfaction. In 1849, the Spring Mill Furnaces became the property of David Reeves, and here again he was called upon to make the necessary plans and designs for their improvement, which was likewise effected in perfect accordance with the owner's requirements. Subsequently, the same gentleman becoming the principal proprietor and director of the Cambria Iron Works, at Johnstown, Pennsylvania, again employed him, as on former occasions, to reconstruct and arrange the new works which were designed to occupy the mill; at the same time he planned the new rafters to support the roof of the building. Subsequently, Reeves, Nichols & Co., of Bridgeton, determined to still further augment their extensive works, and he was again selected by them to arrange for and superintend the erection of a large pipe mill, for the manufacture of butt-welded gas tubes: all of which was successfully completed to the entire satisfaction of the proprietors. Following these came many changes and new improvements at the Phœnix Works, which have tended to make it the finest establishment in the country. Here are built and rolled all the various shapes of iron used for bridges, truss-girders, compound and other beams known to the trade. He was the chief engineer in the construction of the iron work of the great International Bridge, crossing the Niagara river at Buffalo, New York, connecting the latter city with Fort Erie. All the drawings and strain-sheets connected therewith were made in the Phœnix Iron Company's offices, and all the iron was fabricated at these works. Duplicate copies of all the plans, details, etc., were made from the original drawings, and forwarded to the contractor who erected the bridge. A full description of these drawings, as furnished, is given in the book recently published by the chief engineer of that company. The new mill, now in process of erection for the Phœnix Iron Company, is also of his conception, together with the framework and roof, which he has likewise designed. When completed, it will be, it is believed, the most perfect mill in either the New or Old World. Everything in and around this vast establishment bears the impress of his skill, ability and management. Having had all the varied details of the business to superintend, he has probably done more actual work in devising and constructing them than any one else. Not only here has his remarkable ingenuity been displayed, but he has likewise invented and patented many articles at different times during his long career. Among these may be cited: 1. A combination lock, with four dial plates graduated and numbered on the outer circle, with index pointer over each, and secured on outside of lid; 2. A spoke tenoning machine, for cutting round tenons on the ends of wheel spokes. By the use of this machine all hard labor is obviated, while the work is more perfectly performed, being in fact a great saving in time and labor to the

employer; 3. A machine for sawing felloes for wheels, whereby all labor by hand is avoided; 4. A novel improvement for collecting the waste gas from blast furnaces and utilizing the same in the generation of steam, and for heating the blast for said furnaces, and for other purposes; 5. A new method for applying the waste heat from puddling and heating furnaces, to steam boilers, located alongside, or over the top of said furnaces, for the purpose of generating steam for the use of the mill, or other purposes; 6. A new mode of upsetting eye bars by screw or other pressure, now so extensively used in building bridges, trestle work for aqueducts, etc.; 7. A novel mode for the straightening of railroad bars by direct pressure, applying taper swedges between rail and moving plunger; 8. A new method for elevating railroad bars and other iron to accommodate different levels, for the purpose of loading cars, etc.; 9. A novel mode of constructing piles or faggots for rolling beams or girders, used in fire-proof floors, and for other purposes; 10. A new method of manufacturing wrought iron or steel columns, with the shaft fluted—as in the Roman and Greek orders—and other ornamental styles; 11. A new and improved turn-table for swing bridges. Two of these are now in use on the great International Bridge already mentioned. By these and other useful inventions he is known all over Pennsylvania as one of the best mechanical engineers of the day, and is highly esteemed not only for his professional ability, but for those social qualities and that sterling integrity which are ever the characteristics of an able, intelligent and worthy citizen.

EDWIN CLINTON, Brush Manufacturer, Philadelphia, was born in Petersham, Massachusetts, in May, 1821. After receiving a limited education in his native State, he moved to Philadelphia, where he commenced his business career by entering the workshop of William Thompson, where he began at the lowest round of the ladder and mounted, step by step, till he reached the top, when he found himself a thorough master of the trade in all its details. While occupying this situation, he was preparing himself, by strict economy, for his future entrance into business for himself. This he was enabled to effect in 1844, when he laid the foundation of his present extensive manufactory. Possessing but a very limited capital, he was forced to commence in a very humble way, in a small room at Second and Laurel streets, and with only one assistant. There he remained for three years, his business gradually developing itself till it had grown sufficiently to warrant his removal to the more commodious premises at No. 44 South Fourth street. Though much increased, it was still limited, and, on taking possession of his new store, he found his stock of goods insufficient to make a respectable business show. In eleven years, however, his goods had multiplied to such an extent that the dimensions of the store were inadequate to contain them, and he found himself under the necessity of removing to more capacious warerooms. He effected the required change, in 1858, by removing his stock to the extensive premises situated at No. 908 Chestnut street, a property which he purchased, renovated and fitted up suitably for his business, making it what was at that time the handsomest store in the city. Spacious as was this edifice, it soon, in its turn, proved too circumscribed for his purposes, and he found himself compelled to move once more. After expending $18,000 in improvements, he transferred his business to its present location, at Nos. 931 and 933 Market street, a building having a front of 42 feet and a depth of 170 feet. With his customary taste, he beautified his new premises, making them among the most convenient and best appointed in the city; indeed, foreigners and strangers visiting Philadelphia have repeatedly declared that there is no such brush store, containing such a stock and variety of the best goods as he offers to the trade, to be found in the world. All this has been accomplished from the smallest beginnings, in the comparatively short space of twenty-nine years, and offers great encouragement to all young men starting in business with limited means. The success thus obtained is by no means the result of chance, but is entirely due to unremitting labor, combined with excellent taste and a determination to excel all competitors. This he has undoubtedly accomplished, and the "Clinton Brush" is universally known for its superiority throughout the country. Previously to his embarking in the trade, the American brushes were unquestionably inferior to those of foreign manufacture, the latter commanding higher prices. As there appeared no sufficient reason why such should be the case, he resolved to remedy the defect, and make the domestic fully equal to the imported article. To accomplish this important change and check the flow of importation, he brought to bear his perfect knowledge of the art, his good taste and a constant endeavor to make the goods manufactured to-day superior to those of yesterday. He has fully succeeded in his attempt, and to-day stands at the head of American brush makers, his goods being unsurpassed by those of any manufacturer in the


BELMONT OIL WORKS

world. He makes brushes for use, and not merely for sale; and, as an evidence of his skill in his trade, it may be mentioned that brushes manufactured by him eighteen years ago are in use at the present day. Ever on the watch for novelties, he is usually the first to bring out or invent new styles; and, as he personally superintends their manufacture, articles have been produced which have justly won him the celebrity he enjoys, identifying his name with the brush trade in this country. It is safe to predict that the day will come when he will have turned the tide of importation—as manufacturers in other departments of industry have done—so that, countries from which we were forced to purchase brushes will, in their turn, buy them from us. In 1864, he admitted as a partner his book-keeper, William Harrison Eisenbrey, who proves an able coadjutor. As a man, Edwin Clinton possesses some noteworthy characteristics. His habits were always strictly temperate, and his frugality such that, for many years after he had commenced business on his own account, he maintained himself on journeyman's wages, while his industry was so untiring that, for a period of fifteen years, he was frequently at work from twelve to twenty-one hours a day. He is remarkable for good common sense and integrity, and possesses business qualifications of the highest order, which have obtained for him not merely a local, but a national reputation in his line of business. He was married, in 1842, to Miss Nagle, of Philadelphia, and has a family of three sons, Edwin T., Leon A. and Winfield Clinton, on whom will probably devolve, at a future day, the task of maintaining the name and character of the business.

THE BELMONT OIL WORKS, located at Lancaster avenue and Fiftieth street, Hestonville, in the Twenty-fourth Ward of the city of Philadelphia, commenced operations in March, 1862, under their present proprietor. At that period, the business of refining petroleum was a new one, and this establishment, together with the "Crescent"—since closed—were the pioneers of the art. A portion only of the present site was occupied, about one-half an acre in extent, which sufficed to include the buildings and yards then used for the purpose. Four or five small cast iron stills, each holding about twenty-five barrels, were all that were at first required to carry on the refinery, and, by the slow process then in vogue, about 150 barrels per week was the entire capacity of the establishment, which then employed some twelve hands. But the business proved a success, and from time to time the buildings have been enlarged, and the most complete system introduced, until, to-day, the buildings and areas embraced by these works cover an extent of about two and a half acres. There are six stills constantly in operation, each holding 300 barrels, and capable of turning off together about 10,000 barrels of the refined article each month. There is a tankage capacity on the premises of about 20,000 barrels. The oil is transported from the wells in the western part of the State in tank cars, which are run upon a siding directly to the premises, and are so arranged that their contents flow spontaneously into the heavy iron tanks (each holding 5000 barrels), whence it is distributed to the stills as required. The process of refining is effected in about three days. Water is abundantly supplied from wells on the premises, it being pumped therefrom by steam power. An engine of fifteen horse power is employed for this purpose and also for driving the blowers, which are used for agitating the oil. The principal products are Paraffine, 25 and 28 degrees; Natural Lubricating and West Virginia, 28 to 30 degrees; Fluid, 65 degrees; Store Oil, 75 degrees; Gasoline, 88 degrees; Head Light Oil, 140 to 180 degrees, Fahrenheit test, etc. This establishment is the only one making the celebrated "Belmont" Burning Oil, and devotes especial attention to the production of fine machinery oils. The residuum is converted into various forms, one of these being paraffine, so extensively used for making candles which are superior for illuminating purposes to sperm or wax. When first collected, this mass is of a dense black color, but by chemical manipulation is converted to an almost snowy whiteness. Science has progressed in these arts as well as in others with rapid steps of late years, in fact, demonstrating, that where, in the infancy of the business, but sixty-five per cent. of the crude material was convertible into articles of merchandise, and the balance, over one-third, was worthless, or seemingly so, yet, at the present time, the large proportion of ninety-five per cent. is utilized, leaving but five per cent., or, only one-twentieth, as of no value. The number of hands now engaged is over thirty, who are constantly present, in separate gangs, night and day, as the works are in operation all the time, never ceasing for a moment, unless for an accident. The great success which has attended their proprietor has been due to his enterprise and energy—his determination to overcome all obstacles, and to his constant endeavor to improve upon all that he has done. Although he has suffered three several times from the burning of the works, yet he

has never allowed himself to be conquered by these unlooked-for casualties, but has scarcely waited for the cinders to scatter ere he has made arrangements for the immediate re-erection of the buildings destroyed, and always on an enlarged and improved scale.

WILLIAM LUKENS ELKINS was born in Western Virginia, May 2d, 1832, of Quaker parentage, and his father, George W. Elkins, was one of the earliest manufacturers of paper in the country. When eight years of age, his parents removed to Philadelphia, and he attended school till he was fifteen years old. At this age, he went into a store as entry clerk, and remained there a year. He next engaged in the lumber business, but, a disastrous freshet occurring, the fruits of his industry and toil were swept away in a night. He then proceeded to New York, where he commenced the produce business, in which he succeeded. After a year's absence, he returned to Philadelphia, where he associated himself with Peter Saybolt, and engaged in the same calling, at Callowhill and Second streets, in which, with their New York house, they conducted probably the largest line of that business in the country. In 1860, he purchased his partner's interest, thus becoming sole proprietor, and carried it on with increased success. Shortly after the discovery of petroleum in Western Pennsylvania, he invested a considerable amount in shares, and, having visited the "Oil Regions," became convinced of the reality of the discovery, and that his true sphere was in the refining of the crude material. On his return to Philadelphia, the Belmont Works were projected, as above noted. He has also been the proprietor of the Park Refinery, which he acquired in 1866, and operated until it was sold to the Park Commission, in 1869. He purchased the Monument Oil Works in March, 1867, their capacity at the time being 200 barrels per week: after holding them eleven months, during which time he increased them so as to yield 11,000 per week, he sold them, in February, 1868. He is also connected with the Riverside Oil Works, near Alleghany City, Pennsylvania, operated by the firm of Elkins, Bly & Co., and has an interest in ten wells which are daily producing a large amount of petroleum. Altogether, his investments in oil amount to fully $300,000. He was one of the Commissioners selected by Mayor Stokley, in 1873, to represent the city of Philadelphia at the Vienna Exposition, the report of which contains the most valuable suggestions for the great Centennial Exposition of 1876.

FROGMORE MILLS, Garsed Brothers, Proprietors, are situated on Powder Mill road, near the Frankford bridge. The site on which they stand is a portion of the property transferred by Stephen Decatur to John H. Worrell, May 1st, 1810, and by him sold to Isaac T. Longstreth, July 1st, 1816, who in turn ceded his right and title, February 7th, 1826, to Charles W. Smith and others. The latter disposed of the property to Samuel Comly, March 29th, 1827; it was afterward purchased by Samuel Pilling and James Bolton, April 7th, 1845. They converted the whole of the works, including the grist and saw mills, into a bleachery, and afterward established a print factory, extending the buildings to the west side of the creek, to the site now occupied by Frogmore Mills. After the death of Samuel Pilling, they passed into the hands of James & W. Horrocks, May 15th, 1852, and the latter continued them until 1857, when they were leased by Israel Foster and converted into a woollen mill. He sold his lease and machinery to R. Garsed & Brother, in 1863 or '64, and purchased the property, March 31st, 1865. Having sold one-half his interest to James Whitaker, March 31st, 1866, they were leased to Garsed Brothers, who began to operate them as a woollen mill, April 1st, 1866. They were entirely destroyed by fire on the night of June 14th following; but, in less than a week, preparations were commenced for rebuilding, and, foundation walls six feet thick having been laid, there arose upon the ruins of the ancient structure a stately four story stone building, 110 by 40 feet. At the same time, there was erected a picker house, 42 by 38 feet, and the works now include engine and boiler rooms, doubling room, dye, bleaching, and dry houses, stables, offices, and all necessary buildings.

Richard Garsed, proprietor of Wingohocking Mills, and the senior partner of the firm of Garsed Brothers, purchased, February 1st, 1867, and continues to own, the real estate. He sold his interest in the machinery and business, January 1st, 1872, to the two remaining partners, Alfred W. and Harry T. Garsed, who still manufacture under the name of Garsed Brothers.

Frogmore possesses a fine water-power, which is utilized by means of a 52 inch Leffel turbine wheel, with 12 feet head of water. Additional power is derived from a fine 100 horse Corliss engine, supplied with steam from three cylinder boilers, 40 feet long and 3 feet in diameter, which also furnish heat to the drying house and the mill in cold weather. They run 3500 spindles and 128 looms, with all necessary preparatory and finishing ma-

Wm L Dennis

Fremont Mills, Lead, Lester, Rapp & Co, Franklin Penn.

chinery, producing monthly about 30,000 pounds of yarn, and more than 85,000 yards of cotton goods. They give employment to about 125 hands. The introduction of the most improved labor saving machinery has contributed to raise the standard of goods and reduce the number of operatives. The arrangements for light and ventilation are most complete, and the wide extent of open space surrounding the mills supplies an abundance of pure air. Great attention is paid to the comfort of the hands, and the safety of life and property is well provided for.

THE QUAKER CITY STEAM FLOUR MILLS, Detwiler & Hartranft, Proprietors, were commenced in 1854. The firm at that time was composed of Benjamin Detwiler, who died in the following year, 1855, and Samuel Hartranft. The son of Benjamin Detwiler, John S. Detwiler, succeeded, on his father's death, to his position in the firm, and thus it has continued ever since. The trade at first was entirely a local one, but has since been developed into an extensive export one, a very large portion of the produce of the firm being shipped to the West Indies, chiefly Barbadoes and Trinidad. The market for flour in that quarter has of late years attracted the attention of shippers, in consequence of the decline in the demand for the manufactured article in European markets, the shipment of flour to these latter having been almost entirely superseded by the shipment of the grain in the raw state. The increase of the business of the firm having become great enough to require larger premises, they met it by establishing other mills; and they have now in full operation three mills—the Quaker City Flour Mills, the Girard Flour Mills, in Philadelphia, and the Mount Vernon Flour Mills, at Manayunk. The Mount Vernon Mill was established in 1869, and the Girard in 1871. The firm have fifteen burrs at work, producing, in all, some 600 barrels of flour per diem, or about 175,000 barrels per annum, representing a pecuniary value of about $1,225,000. They produce several well-known brands, which have won for themselves a sound reputation, and for which a ready sale is always found, both here and abroad.

The firm is one of those business houses—so numerous in this State—which adopt a steady-going, old school policy, keeping the even tenor of their way through all changes; thus securing a solid position and character for themselves, and, in the aggregate, building up that reliable and substantial name for which the Keystone State is famed.

Samuel Hartranft has just (1874) been elected President of the Commercial Exchange, of Philadelphia.

TREMONT MILLS, Israel Foster, Proprietor, are located in Frankford, Philadelphia. About the year 1800, Stephen Decatur owned a powder mill, located on a portion of the present site, upon which were also grist and saw mills. He disposed of the property, May 1st, 1810, to John H. Worrell, who retained possession until July 1st, 1816, when he ceded his right and title to Isaac T. Longstreth. They were purchased, February 7th, 1826, by Charles W. Smith and others, who, in turn, sold them to Samuel Comly, March 29th, 1827. Samuel Pilling and James Bolton purchased, April 7th, 1845, and converted all the mills into a bleachery, and subsequently established a print works. They erected the Bridge mill, 70 by 40 feet, four and a half stories in height, and extended the works to the west side of the creek. After the death of Samuel Pilling, the works passed into the hands of James and W. Horrocks, May 15th, 1852, and they operated them until they were leased, in the autumn of 1857, by Israel Foster, who converted them into woollen mills, and continued to operate until he sold his lease and machinery to R. Garsed & Brother, in 1863, with the design of retiring from the manufacturing business. He purchased the property, March 31st, 1865, and having sold one-half his interest to James Whitaker, March 31st, 1866, the mills on the west side of the creek were leased to the Garsed Brothers the following day, April 1st, 1866. Israel Foster & Co. resumed manufacturing in 1866, and continued till 1873, when Israel Foster assumed the management alone. The mills occupied by Garsed Brothers were entirely destroyed by fire, June 14th, 1866, but, in less than a week, workmen were removing the *debris*, and there was speedily erected a stately stone structure, 110 by 40 feet, with picker house, 42 by 38 feet, and other buildings, which were filled with cotton machinery by the brothers. This property was sold to Richard Garsed, February 1st, 1867, reserving a right for Tremont Mills of an uninterrupted flow of water through an eight inch pipe, for cleansing, etc. The old grist mill (Tremont Mill) was originally 50 by 50 feet, two and a half stories, but was remodelled and enlarged by Mr. Foster, in 1865, and is now four stories, 85 by 50 feet. He enlarged the Bridge Mill in 1871 and

1872, by the addition of 30 feet, giving a fine stone structure, 100 by 40 feet, four and a half stories. There is also a four story stone building, 32 by 32 feet, used for manufacturing and storage; a frame building, 60 by 40 feet, for hand looms, erected by Israel Foster, in 1866; a three story brick building, for the same purpose, 35 by 24 feet, erected by him in 1867; and a building up the creek, which, having been remodelled by him, is now about 80 by 40 feet, two stories, and is used as a dye house, bleachery and woollen factory. There are also commodious offices, and all necessary outbuildings. The works contain five sets of woollen machinery, two sets of worsted machinery, seventy-five hand looms and twenty-four power looms for carpets, five blanket looms, 1900 spindles, and all the requisite preparatory and finishing machinery. The motive power is derived from two steam engines of fifty horse capacity, each driven by boilers of seventy and seventy-five horse power respectively. The establishment is complete within itself, taking the wool in a raw state, making all its own yarn, dyeing its own goods, and sending them out ready for market. It has a capacity for producing daily 1000 pounds of yarns, 1000 yards of two and three-ply ingrain, extra, super, damask, Venetian and Palatine carpets, and thirty-five pairs of blankets of various sizes, grades, and standards. This production consumes over 3000 pounds of wool per day, and gives employment to from 400 to 500 hands, whose pay roll averaged over $8000 per month for years in succession.

ISRAEL FOSTER was born in Lancashire, England, December 27th, 1808, and came with his father to the United States in 1821, having been educated in his native country. He went into the woollen mill of Captain Tower, near Manayunk, and, in 1823, the family removed to Bloekley, where he worked in Kershaw's mill. He afterward wove broadcloth in the mill of Irvin & Shaw, at Manayunk, becoming manager of their carding and spinning department, and continuing with them for nearly twenty years. He associated in partnership with John Augustus Newmann, in 1842, and engaged in the manufacture of cloths and fancy goods, at the Falls of Schuylkill. After the death of Mr. Newmann, he purchased the deceased partner's interest, and operated alone until he transferred his business to Cressonville, about 1853, and there continued until his removal to Frankford, in 1857. Few men are more thoroughly acquainted with the early history, progress and practical details of the manufactures of this Commonwealth.

THE RICHMOND DYEING AND FINISHING WORKS, James Martin & Co., Proprietors, were originally established, in 1838, on Richmond road, about one mile below the present site, by James Martin, an experienced English weaver and dyer. The premises were small and unpretending, and all the work therein was done by hand, by six operatives, three of whom were members of the family, and are at present members of the firm. In 1850, the works were removed to the location they now occupy, at the corner of Richmond and Tioga streets. Here, the introduction of machinery performs the labor of two thousand men, enabling the proprietors to carry on the business of dyeing and finishing to an immense extent. A great portion of this machinery has been invented or improved by different members of the firm, each of them having had a long experience in the business. Eight steam engines, varying in power from four to fifty horse, are constantly engaged in working the machinery, and 150 men, beside a considerable number of women — the latter in the finishing rooms — find employment at these works. The material which is dyed and finished here comes from the mills of Georgia, Alabama, Massachusetts and Rhode Island, the merchants' warerooms and the factory, and embraces nearly every variety of cotton goods, such as ducks, osnaburgs, drills, wigans, silesias, cambrics, ginghams, Canton flannels, jeans and cottonades. These are dyed in high colors, indigo, black and leads, leads and tan, tropical blue, etc. Other goods are finished for the book trade, shoe trade, etc. The principal part of the drugs used are imported by the firm. The buildings in which the various operations are performed are erected in the most substantial manner, and are possessed of every convenience known to this branch of industry. The goods are received in the gray yard, and the bales of both raw and finished are taken to the stitching room, where, by machinery, piece after piece and bale after bale is made ready for the bleach house. Thence they pass to the dye house, which is divided into as many rooms as there are colors in their catalogue. Subsequently they reach the sizing and drying rooms, the latter being probably the most interesting feature in the whole establishment; for here, a wet heavy piece of dull looking material, which one would not care to own, is, in the space of two or three minutes, passed over eighteen or twenty large cylinders, heated by steam, and converted into merchantable goods, all ready for the warehouse, except the measuring and packing. Two thousand barrels of flour and 800 barrels of starch

Samuel Hill, Esqr. Philadelphia. Published by Carey & Lea, Chestnut St.

Israel · Foster.

are used annually in the stiffening rooms of this establishment. From four to five thousand tons of coal are also used during the same period. There are three tanks containing water, two of the capacity of 12,000 gallons each, and one holding 18,000 gallons. In 1872, these works "handled" 175,000 yards of goods each working day (over 31,000 miles per annum), beside 10,000 pounds of yarns and warps; it also averaged 3000 pounds of raw stuff daily. The finished materials are sent to every State in the Union, from Maine to Oregon. Thomas Martin, brother of the founder, and Thomas J. Martin, son of the principal, became partners in the firm in 1851. In 1864, James T. Martin, son of Thomas Martin, and John Thornley were admitted into the firm. In 1868, Edwin Martin, also a son of the senior member, was added to the co-partnership. All of these had served in the establishment from boyhood to manhood.

JAMES MARTIN was born in Bolton, England, in 1801, and was one of seven brothers who there learned the art of weaving. With their parents, they all emigrated to the United States, in 1827. James was engaged in the weaving business both in Chester county and in the vicinity of Philadelphia for several years, and finally worked as a journeyman for five years in a dye establishment. In 1838, he established the works above described.

THOMAS MARTIN, brother of James Martin, was one of the seven brothers who came to this country in 1827, and was himself a practical weaver. He was born in Bolton, England, in 1807, and worked as a wool, cotton, or silk weaver. He followed his trade, after his arrival in America, until his brother James established the dye works. He then worked for him until 1851, when he became a partner. Although both these gentlemen enjoy a competency, they are daily seen at their establishment, in full work, and always taking as lively an interest in its operations as at its inception.

SCIOTA MILLS, Manayunk.—Thomas Schofield, the Proprietor, carries on the manufacture of carpet yarns in one portion of these mills, having purchased the property, in 1870, from Mrs. Laycock. The original building was a very old one. He commenced with three sets of machines, and had occupied the premises but a single year when the property took fire and was partially destroyed. He immediately rebuilt the same, adding two stories to the main building, making it five stories in height, each floor measuring 60 by 40 feet. The additional building of the same dimensions, four stories high, is in his occupancy, the main building of five stories being rented to Dawson & Shaw, manufacturers of jeans. He likewise erected the necessary additional outbuildings, which now consist of picker, dye, dry and stock houses, office, etc. The mill now contains six sets of woollen machinery, with necessary preparatory and finishing apparatus, all in full operation. The capacity of the works enables it to produce 50,000 pounds each month, consuming about 75,000 pounds of stock. Employment is given to twenty-three hands.

THOMAS SCHOFIELD was born, June 7th, 1837, in Columbia county, New York. His father, Elijah Schofield, was a manufacturer, and the son, at the early age of nine years, entered the mills. In 1847, the family removed to Manayunk, and, in 1849, he went to the cotton mills of Meadowcroft, where he stayed some six months, and thence passed to W. T. Crook's woollen mills, in Delaware county, where, in company with his father, he remained twelve years, being employed in the card-room. From this place he went to Simeon Lord's cotton mill, at Avondale, where he was employed between two and three years. In the spring of 1858, he went to Dobson's mills, at the Falls, and remained there until he engaged in business on his own account, in 1865. He located at No. 1310 Lawrence street (Lodge's factory), and associated himself with Benjamin Kenworthy, under the style of Kenworthy & Schofield. They began the manufacture of shoddy, but, in the course of the following year, they dissolved partnership and closed the business. He next commenced his present occupation, as manufacturer of carpet yarns, with one set of machines and seven hands. In 1867, he removed to Nippe's mill, on Mill creek. In 1870, he added another set of machines, and, on his purchasing the Sciota Mills, during the same year, he increased the capacity of his producing machinery by a third set; since then it has been doubled, there now being six sets.

UPLAND MILLS, Upland, Delaware county, Pennsylvania.—Over half a century ago, John P. Crozer associated with G. G. Leiper, and they became the proprietors of a merchant and saw mill on Ridley creek, about three miles above Chester. The partnership was formed June 25th, 1821, and continued only until the following autumn, when,

finding that their expectations were not realized, they dissolved their firm by mutual consent. At a subsequent period, John P. Crozer rented a part of the first, with the second and third stories of the same mill, for the purpose of cotton spinning. Finding it difficult to secure new machinery, he purchased some which had already been in use, to the amount of about $4000, and in November, 1821, erected it on the premises; it was all in place, and the mill commenced operations in February, 1822. Unforeseen obstacles having arisen, he seemed on the verge of ruin, when he was temporarily relieved by a loan of $600 on the security of John Lewis. His characteristic energy and perseverance prevailed over every difficulty, and, in the autumn of 1824, he purchased Mattson's paper mill, on the West branch of Chester creek, including 180 acres of land, for $7330, for which he paid with borrowed money. He took possession of his new property in 1825, and named it West Branch. He ceased operations at the rented mill in May, and removed to the new purchase, which he had altered to meet his wants, and resumed business early in August, 1825. His prosperity was unchecked until 1835, when, by the insolvency and death of a customer, he lost about half of his previous accumulations. Though stunned by the blow, he was far from being crushed; and, redoubling his energies, borrowed additional capital for the purchase of twenty power looms, and now began to consume his own yarns. He also purchased, in 1839, another paper mill, at the junction of the West branch with Chester creek, and, having erected a new mill, began to operate it, in addition to the West Branch Mill. He removed his residence thither in November of the same year, and named it Crozerville. A financial storm, commencing in February, 1842, forced a reduction of wages in manufacturing establishments, and resulted in a general strike of operatives, lasting twelve weeks. During this period, he stood as firm as a rock, and, when they yielded to his superior judgment, he freely forgave every indignity which had been offered him. Although the depression continued, he kept his mills running, and in January, 1843, resumed with full force. On February 16th, 1843, he met with a terrible accident, by being thrown from his sleigh, and lay crippled for many months and almost incapacitated for active business. As misfortunes never come singly, this affliction was followed, August 5th, 1843, by a disastrous flood, which swept away a new stone factory, 76 by 36 feet, at Knowlton, with portions of the mills at West Branch and Crozerville, involving a loss, in property, machinery and productions, of over $50,000. The damaged mills were repaired with all possible speed, and operations resumed. In February, 1845, he purchased the Flower estate, on Chester creek—two miles from Chester—and commenced the erection of a mill 158 by 52 feet, and five stories in height. He named his new purchase Upland, and, having erected a handsome residence, removed thither May 19th, 1847. He had already received, January 1st, 1847, his eldest son, Samuel A. Crozer—who had long shared the weighty cares of his extensive business—into partnership with him, the name and style of the firm being John P. Crozer & Son. Mill No. 1 was enlarged by the addition of a wing, 80 by 45 feet, in 1852, which was followed by the erection of a separate building, 27 by 30 feet, in 1853; and, subsequently to this last date, there have been added all the offices and outbuildings required for their successful operation. Mill No. 2, 190 by 52 feet, four stories high, was erected in 1853, and J. Lewis Crozer having been admitted into co-partnership, January 1st, 1853, the firm became John P. Crozer & Sons. The new firm continued to operate the business, George K. Crozer being admitted thereto, July 1st, 1861. Mill No. 3, 220 by 60 feet, of three stories height, was commenced October 14th, 1861, and, having been completed early in 1862, was put into operation in May of that year. On the 1st of January, 1863, a fourth son, Robert H., was added to the firm, the name and style of which remained unchanged. After the death of John P. Crozer, March 11th, 1866, Mill No. 2, with the mills at West Branch and Crozerville, became the property of Samuel A. Crozer, who, during the same year, erected a two-storied mill, 150 by 55 feet—in addition to Mill No. 2—and also a dye house and dry house, 100 by 30 feet, attached to the old mill. Mills Nos. 1 and 3 passed into the hands of the three brothers, J. Lewis, Robert H., and George K. Crozer, who have since operated under the firm name of John P. Crozer's Sons. They enlarged Mill No. 3, in 1872, by the addition of a building 100 by 60 feet. These two mills now contain 480 looms, and 18,532 spindles, beside all the necessary preparatory and finishing machinery; that portion in No. 1 being driven by an engine of 200 horse power, to which steam is supplied from seven boilers. The motive power of Mill No. 3 is also furnished by an engine of 200 horse power, supplied from six boilers and two turbine wheels, estimated at forty horse power each. These mills consume each year about 3200 bales of cotton, weighing 1,473,000 pounds; 1,300,000 pounds of yarn; 3120 tons of coal; 85 barrels of oil; 650 barrels of flour; 28,500 pounds of indigo; 135,000 pounds of sundry dye stuffs; 208,000 feet of

John P Cozzens

box boards, and $7150 worth of twines, brooms, etc. They produce, per annum, about 1,200,000 pounds of yarn and 5,655,000 yards of cotton cloths. The firm have 156 commodious dwelling houses for the accommodation of their 450 hands, and the pay roll amounts to $156,000 for the year. The mills are lighted by gas from a meter with a capacity of 13,000 cubic feet. Upon these large establishments there is constantly maintained an insurance against fire, aggregating $195,000. Mill No. 2, operated by Samuel A. Crozer—who also owns the mills at West Branch and Crozerville, and runs them in partnership with Samuel C. Lewis—contains 294 looms and 10,504 spindles, with all the requisite side machinery for preparing and finishing. The motive power is embodied in a 250 horse engine, connected with eleven boilers, arranged in four sets. It consumes about 2080 bales of cotton per annum, beside all the requisite accompanying materials, and is lighted by gas from a meter belonging to the establishment. Materials are purchased in a raw state, and the mill—which is complete in itself—sends forth the goods ready for market. The annual production amounts to about 3,900,000 yards of checks, ginghams and osnaburgs. The operations give employment to about 300 hands, for whose accommodation there are provided upwards of 100 comfortable and convenient dwellings, and for whom every provision that can add to safety and health is made. There are also two bath houses in the mill, one for each sex, supplied with both hot and cold water. Upland Mills, with nearly 300 houses for the accommodation of the employés, and the private estates of the proprietors, occupy nearly the whole of Upland, and cover an area of about 350 acres. Every available improvement is introduced, and the machinery is of the very best quality and pattern. The hands employed are of the most skilful, and the productions have long maintained an enviable reputation. An admirable system pervades the establishments, and the visitor is impressed with the precision and order observed.

JOHN PRICE CROZER, the son of John and Sarah (Price) Crozer, was born in Springfield, Delaware county, Pennsylvania, January 13th, 1793. The schools of his day afforded limited educational advantages, but he imbibed from his cultured parents a love of study; and he pursued a systematic course of investigation through life. Before attaining his majority, he managed his father's farm for some years, and so continued until the spring of 1820, when he sold his stock and implements. He embarked in the enterprise above mentioned, with G. G. Leiper, June 25th, 1821, and, after many struggles, finally triumphed over every obstacle. He was public spirited, liberal, and always ready to promote the interests of every beneficent design. His bounteous donations succored many valuable enterprises, while he aided and originated philanthropic undertakings without measure. He was an ardent patriot, and, during the war of the Rebellion, gave his influence, time and money to the support of his country. His greatest efforts were exercised to promote the interests of the Christian church, and particularly of that branch with which he was connected. In him education had also a sincere and liberal supporter. The incidents of his life—as more fully detailed in the *Biographical Encyclopædia of Pennsylvania of the Nineteenth Century*—are noble incentives to persevering honest effort for the accomplishment of a just end.

SAMUEL A. CROZER was born at West Branch, Delaware county, Pennsylvania, December 25th, 1825. To the education obtained in the schools which he attended in youth—including select academies in Wilmington and Philadelphia—he has added a thorough and systematic course of reading and study, which, with the benefits derived from travel, both in this country and abroad, have conduced to form a man of unusual culture. For some years previous to his admission to partnership with his father, he had been engaged in the practical operations of the mills, and thus had relieved his parent of many of the burdens otherwise devolving upon him. He was for many years a director of the Delaware County National Bank, and for a brief period its President. Upon the death of James M. Linnard, in October, 1863, he succeeded the latter as President of the Pennsylvania Baptist Convention for Missionary Purposes, and has uniformly manifested a deep interest in all the benevolent enterprises of the church, to which he contributes with great liberality. He erected a handsome chapel and Sunday school rooms, in 1870, at Upland, at a cost of nearly $25,000. He has been President of the Board of Trustees of the Crozer Theological Seminary since its foundation, and a generous contributor to its endowment. He has been a deacon of the Upland Baptist Church since his father's death, and being an active and public spirited man, though unostentatious in manner of procedure, he is a son well worthy to follow in the footsteps of his illustrious father. Not only has he provided a house of worship for the town where he resides, but has also erected chapels in Leiperville and South Chester.

He has filled the office of Chief Burgess of Upland since its incorporation as a borough.

GEORGE KNOWLES CROZER was born at West Branch, November 12th, 1839. His early education was attended to at home, and subsequently he became a pupil at the Chester Academy, where he was prepared for college. He entered the Freshman Class of the Collegiate Department of the University of Pennsylvania, graduating therefrom in the class of 1860. After leaving college, he immediately devoted himself to the acquirement of a knowledge of the business, and was admitted to the firm, July 1st, 1861. He was among those who volunteered their services to defend his country's flag, and commanded a company in the campaign which culminated in the battle of Gettysburg. Since the death of his father, he has been elected and acted as a Manager of the American Sunday School Union, and also Manager of the Bible and Baptist Publication Society. He was one of the original founders, and a member of the Board of Managers of the Baptist Home since its establishment; and for some years an officer, and finally the President of the Young Men's Christian Association of Chester. He has been a Trustee of the Crozer Theological Seminary since its organization, and is especially active for the promotion and interests of the church with which he is connected, both locally and generally. He takes a high interest in all that respects the improvement of the borough of Upland, which is especially manifested by his aiding in the erection of comfortable and substantial dwellings for the numerous employés of the mills, etc. He is also a member of the Council of the Borough.

ROBERT HALL CROZER was born at Crozerville, September 4th, 1841. He was educated at the same institutions as his brother, George K., and subsequently gave his earnest attention to the business, in order to enable him to become a member of the firm and a participator in its labors and solid results. He is a Trustee of the Crozer Theological Seminary, and takes a deep interest in various benevolent enterprises. He served (1871–'73) as a Director of the Delaware County National Bank. He is also a member of the Board of Directors of the Chester Improvement Company, besides being connected with other local matters and offices. He is President of the Town Council of the Borough of Upland.

SCHMERTZ' GLASS WORKS, Belle Vernon, Fayette county, have been in operation for over forty years. The factory was originally established in 1833, by William Eberhart, and is located at Belle Vernon, distant some forty-two miles from Pittsburgh. During the first year of its operation, it produced about 20,000 boxes of window glass. It subsequently passed into the hands of George A. Berry & Co., who retained it until July, 1855, when Robert C. Schmertz, the present proprietor, purchased Berry's interest. He then made a large number of improvements about the establishment; among others, he built the largest glass flattening oven in the United States. It is capable of producing a plate of glass of double strength, and measuring 30 by 86 inches. The amount of glass manufactured differs very materially from that of former years, as also does the quality. The product for the year 1872 was 60,000 boxes, threefold the yield of the first year, while the difference in value was far greater, as will be seen by the great variation in the price. In 1833, the rate was $1.50 and $2 per 100 feet, while that of 1872 sold for $4 and $6 per 50 feet.

ROBERT C. SCHMERTZ was born in Westphalia, Kingdom of Prussia, November 7th, 1829. He was but three years of age when he went to Pittsburgh. What little education he received was obtained in the public schools of that city, his whole term of study not exceeding two years, and all prior to the age of twelve years. He commenced life as an office boy in a banking house, where he remained for a considerable time, and then resolved to learn the tin-smithing trade. With this view, he served an apprenticeship of four years, commencing April 1st, 1845, and gained a complete knowledge of the business. On quitting the establishment, he was tendered a clerkship in a bank, which he accepted, remaining in this position for a period of over six years. He resigned in July, 1855, having been meanwhile appointed Paying and Receiving Teller in the Mechanics' Bank. He held this latter important trust until 1860, when he severed his connection with that institution to accept the office of Cashier of the Iron City Trust Company. In the meantime, as above noted, he had become the proprietor of the glass works at Belle Vernon. In 1860, shortly after his acceptance of the last-named position, the fact that petroleum existed in the neighboring region, in large and apparently inexhaustible quantities, became generally known. Becoming interested in the development of this new branch of industry, he resigned the

Cashiership of the Trust Company, and, associating himself with Colonel James Bleakley, of Franklin, Pennsylvania, the firm of Schmertz & Bleakley was constituted, and they at once embarked in the oil business. For some time past, he has held the office of President of the Allemania Insurance Company, of Pittsburgh. Although frequently solicited to fill official positions in the city and State government, he has invariably declined, seeming to have no political aspirations whatever.

GEORGE WESTINGHOUSE, JR., Inventor and Manufacturer, was born at Central Bridge, Schoharie county, New York, October 6th, 1846. During his entire boyhood, he exhibited a mechanical bent, and he was constantly occupied in fashioning some device. He was educated primarily at the Union High School, Schenectady, and on leaving this institution, with the intention of entering college, concluded—as the civil war was in progress—to volunteer. He enlisted in a volunteer regiment in June, 1863, and remained until November, 1864. After a brief visit home, he went into the navy, and was made a Third Assistant Engineer, in which capacity he served on the "Muscoota," a double-ender. After his discharge from the service, he returned to Schenectady and entered Union College. While there, he invented and built a compound engine. This was not, however, the first one of his own construction. When he was but fifteen years of age, he built his first rotary steam engine. On leaving college, he entered a pattern shop, and remained at that employment until he went to Pittsburgh, in 1868. For several years previous to the last named date, his mind had been constantly occupied in various inventions, and among them was the celebrated "Air-brake." On his arrival in Pittsburgh, he found employment in the steel works of Anderson, Cooke & Co. Having invented and patented a reversible steel frog for railroads, he submitted it to these gentlemen, who were so well pleased with it that they at once commenced its manufacture, and paid him a royalty for the same. He remained with them about two years, and during this time constructed the first set of his air-brakes, and invited the attention of members of the press, master mechanics, and railroad officials to the same, but these barely noticed the matter, or expressed want of faith in its success. He chanced, however, to interest Ralph Bagaley, an iron founder, who, after a thorough examination of its capabilities, became his associate in the enterprise. It was first tested on an accommodation train on the Pan Handle Railroad, in February, 1869. The experiment was witnessed by a number of railroad men. In the following month of August, the Pennsylvania Railroad Company tested it on their own line, and afterwards took the same train and experimented with it through the entire distance to Chicago. Meanwhile, he had taken out his first patent for the same, April 13th, 1869, and since that time has been constantly improving, so that at present he is protected by no less than sixty-five separate letters patent in the United States and Europe. He sailed for England in June, 1871, with a view of introducing the same to the notice of the railway officials of that country. He experienced, however, considerable difficulty, as they were much prejudiced against it. He finally overcame their oppositions, and tested the invention to their entire satisfaction. He is now engaged, in Pittsburgh, in the manufacture of his "Patent Air-brake."

FALLS PARK BREWERY, located at the Falls of Schuylkill, Twenty-Eighth Ward, Philadelphia, occupies a site formerly owned by Richard Penn Smith, from whom it was purchased in 1857. The buildings having been completed by Joseph Steppacher, in 1858, he operated it until September, 1870, when Jacob Hohenadel, the present proprietor, purchased it from Peter Schemm. The property includes about six acres, with a beautifully shaded park for the accommodation of picnics and private parties. On one side of the grove stands the brewery, a building about 160 by 65 feet; and being built in the side of a bank, with four vaults hewn from the solid rock, each 30 by 142 feet, it varies from three to five stories in height. Within the brewery are fine springs of water, furnishing an abundant supply, while upon the premises are other large springs. It now employs about thirteen men, producing 8000 barrels of lager beer per annum; but there is capacity for the production of more than double the quantity. It is supplied with all the best appliances for brewing a superior article of beer.

JACOB HOHENADEL was born in Hesse Darmstadt, Germany, August 19th, 1838. He came to the United States with his father, about 1852, and worked on a farm in Lancaster county, Pennsylvania, until 1858, when he entered the brewery

of Bergdoll & Psotta, at Fairmount. In 1864, he commenced business on his own account, at Broad and Cumberland streets, where he operated a brewery until his purchase of his present property. With few early advantages, he has made his own way in life, and has achieved success by indomitable energy and untiring industry.

THE DUQUESNE MACHINE WORKS, Pittsburgh, James Rees, Proprietor, date from the year 1854, and are located on Duquesne way and Fourth streets. The original building was of brick, 48 by 123 feet; the machine shop being three stories in height, while the blacksmith shop was but of one floor. In this establishment he pursued the business of building land and marine engines, and also sugar mill machinery, employing some thirty-five or forty hands. In 1863, the machine shop and pattern room were destroyed by fire, the act of an incendiary. He at once rebuilt the works in the same style as before, and, having purchased other property, including two three-story brick houses, and aggregating over 25,000 square feet of surface, he erected on these lots an extensive addition to his establishment. During 1863 and 1864, he built several light draught steamers, and sold them to the United States Government. These were popularly known in Western waters as "tin-clads." Since the latter date, he has built a number of steamers, and has done an extensive business in steamboat repairing, which is his specialty.

JAMES REES was born in Caermarthenshire, South Wales, December 25th, 1821, and received his education at a select school in his native land. His parents emigrated to the United States in 1830, locating in St. Clairsville, Ohio, where shortly after his father died. He was obliged to labor at an early age, and found employment in different places, until his mother, with her family of nine children, removed to Pittsburgh. He continued his labors here as "carrying in boy" in a glass house, coal miner, etc., and finally apprenticed himself to learn the foundry and steam engine building business. At the end of fifteen months, the firm dissolved. He then found employment in several different establishments, varying the same by engaging as engineer on several steamers, running on the Monongahela, Ohio and Mississippi rivers. While in the employ of Stackhouse & Tomlinson, he helped to build the iron steam sloop "Michigan:" it was built in sections, and taken overland to Lake Erie. He also aided in constructing the iron steam sloop of war "Allegheny," which has since circumnavigated the globe. In 1844, he went to Butlertown, to build the machinery of a woollen mill, and while there converted a marine engine into a land engine. He was continuously employed until the fall of 1846, when he started in business on his own account. In April, 1847, he purchased the interest of the two Whites, of the firm of White, Hartupee & Co., which now became Rees, Hartupee & Co., and lasted three years, engaged in the steam engine and foundry business. He then commenced another establishment in his own name, at Liberty and Water streets, where he remained until the Pennsylvania Railroad Company occupied the same. His next location was the Duquesne Machine Works, above described. In 1847, he invented a machine for making "hot pressed nuts," which proving successful, he carried on the business for five years as a member of the firm of Carter & Rees. In 1870, he invented and patented a steam "cut off," for puppet-valved steam engines, and applied it successfully to the Pittsburgh Water Work engines. He has served in the City Councils from 1861 to 1871, and is a prominent member of the Masonic Order. He has been a director of the Union National Bank, Boatman's Insurance Company, and Pittsburgh Insurance Company. In 1865, he was a heavy stockholder and President of the Allegheny Navigation Company. In 1870, he was President of the People's Line, which effected, in 1871, a compromise with the Union Line, of which latter corporation he is yet a director. From 1860 to 1873, he built, and owned not less than a fourth interest in, twenty-eight steamers.

RALPH BAGALEY, Iron Founder and Manufacturer, was born in Pittsburgh, December 26th, 1846. He was educated first at the Sewickly Academy, in the town of that name, and subsequently at the Kenwood Academy, in the city of New Brighton, Pennsylvania. After leaving these institutions, he sailed for Europe, and repaired to Dresden, Germany, where he studied for three years, residing in the meantime with the family of one of the leading professors of that university. On his return to the United States, at the age of twenty, he went into the foundry business, and associated himself with Bollman & Co., thus constituting a new partnership under the name and style of Bollman, Boyd & Bagaley. In 1871, this firm

dissolved, the two first named gentlemen retiring. He thereupon associated with him in the business J. B Young, J. S. Seaman and Robert Sleath—the two latter being practical foundrymen — and the firm was changed to Bagaley, Young & Co. In 1869, he became much interested in the "Air-brake," designed for railroad use, and the invention of George Westinghouse, Jr., an ingenious mechanic. After subjecting the same to severe tests, he discovered its great utility, though railroad experts and officials up to that time had looked coldly upon it. So satisfied did he become of its worth that, in three months after it had been patented, he organized, July 20th, 1869, the "Westinghouse Air-brake Company," of which he was at once elected Secretary. This company operates under the various patents—sixty-five in number—which have been taken out since the first was issued, and cover the many improvements which have been since designed. Beside his extensive manufacturing business in Pittsburgh, he is engaged in the mining of iron ore, being a partner of the firm of Wilcox & Bagaley, who operate the Bagaley Mines, at Neganee, Marquette county, Michigan. He is a member of the Masonic Order, having connected himself with Franklin Lodge, No. 221, Ancient York Masons, and subsequently with Duquesne Chapter.

PEROT'S MASTER STREET MALT HOUSE, Philadelphia, William S. Perot, Proprietor. This establishment, which is in the front rank of the many malt houses of Pennsylvania, both as to the quality and extent of its product, is located on Master street, and is bounded by Sixth and Marshall streets. The main building is of brick, five stories in height, and covers an area of 18,540 square feet. Previous to its purchase, in 1867, by its present owner, it was known as Rogers' Carriage Factory, and, during the time of the civil war, had been constituted a United States Army Hospital. After it had passed into the possession of its present occupant, he reconstructed the interior of the edifice, from its very foundation, for the purposes to which it is now devoted—the manufacture of malt—and he introduced therein all the latest improvements known to maltsters, expending thereon, and in the erection of the necessary additions, nearly $100,000. With the care exercised in its construction, and its perfect appointments, it can justly be termed a model malt house. Each story has its own malting floor, with an aggregate capacity of 80,000 bushels of grain; its separate kiln and steeping tub, capable of holding 300 bushels; a reservoir, which can contain 12,000 gallons; and each year, the establishment is employed to the fullest extent of its capacity.

WILLIAM S. PEROT, the founder and sole proprietor of this malt house, was born in Philadelphia, September 23d, 1800. He is the youngest son of Elliston and Sarah (Sansom) Perot. On his father's side, he is descended from the Jay family of New York—French Huguenots—who fled from their native land, in 1685, to escape religious persecution. His grandfather, James Perot, at an early age removed from New York, and settled in the Island of Bermuda, where he married, lived, and died, February 29th, 1780, his wife following him on the subsequent day; both died of an epidemic of putrid fever there prevailing. They left eight children, among whom were Elliston and John Perot, whose long and eventful lives were mostly spent together, and whose business interests and social pleasures were closely allied by the strongest bonds of affection. Elliston Perot came to Philadelphia at the age of thirty-seven, and engaged in mercantile affairs with his brother John, who had preceded him about three years. In 1786, he joined the Society of Friends, and was married the following year. In 1793, he purchased a lot on High (now Market) street, east of Eighth, where he built a commodious dwelling, and where he resided until his death, November 28th, 1834. He was a man of the most sterling integrity, an associate of the most eminent men of his times, and deeply interested in all matters pertaining to the public welfare; he held many positions of honor and trust, and was a contributor to and a member of very many benevolent institutions. His son, William S. Perot, inherited in a high degree the virtues and characteristics of his father. He received his earlier education in Germantown, and subsequently was a pupil of that erudite scholar, Enoch Lewis. At the age of sixteen, he entered his father and uncle's counting house, remained there two years, and, in September, 1818, in connection with his brother Francis, engaged in the brewing business, on Vine street west of Third street, where they continued with uninterrupted success for a period of thirty-five years. In 1853, they turned their attention exclusively to the manufacture of malt, and carried on the business until the spring of 1867, when, by mutual agreement, a dissolution was effected, and William S. Perot purchased and arranged the extensive malt house above described, in which, assisted by his eldest son living, Sansom

Perot, he has since prosecuted the business through each successive year, and with remarkable success. Although he is now in the seventy-fourth year of his age, his mental faculties are unimpaired, and he retains, in a remarkable degree, the vivacity and activity of his earlier years. A large portion of his time and attention is still given to the transaction of the official duties of his positions in various institutions and corporations of the city, which he still holds. During his earlier years, he was an active member of the Philadelphia Hose Company, and for many years was a member of Councils. He is now, and has been for many years, Secretary of the House of Refuge, and for over forty years Secretary and Treasurer of the Willow Grove, and Cheltenham, and Germantown, and Perkiomen Turnpike Companies. He also fills the office of President of the Philadelphia Society for Alleviating the Sufferings of Prisoners.

LINCOLN MILLS, D. Wallace & Son, Proprietors, are located at Manayunk, Philadelphia, Pennsylvania, and were founded by the senior partner, in 1859. The works occupy a lot 144 by 120 feet, and the original building was 80 by 50 feet, and four stories in height, with basement. At the same time was erected a two story dye and dry house, 60 by 40 feet, and other necessary outbuildings. Having been put into operation for the production of cotton and woollen goods, and the business steadily increasing, in 1867 he added 20 feet to the length of the main building, and, in 1872, erected a two story spreader and picker house, 35 by 70 feet, fully doubling the original capacity of the works. The firm name was assumed January 1st, 1870, when James Wallace was admitted to partnership. They run four sets of woollen machinery, 2244 cotton spindles and eighty looms, with necessary side machinery, the motive power being derived from an eighty horse steam engine. The annual capacity of the mills is about 104,000 pounds of cotton yarn for market, beside all the cotton and woollen yarns required for the production of 1,815,000 yards of goods. The marked success attending the efforts of the firm is attributable to the well-known superiority of their goods, and it is evidently their purpose to retain the prestige so justly won.

DAVID WALLACE was born in Ireland, May 12th, 1822, and was there engaged in agricultural pursuits until nineteen years of age, having been meanwhile educated in his native country. He then embarked for the United States, where he landed June 15th, 1841, proceeding directly to Manayunk, and engaging in boating until 1854, when he associated in partnership with John F. Preston, as Preston & Wallace, and commenced manufacturing in Joseph McDowell's mill. This firm operated for about two years, and then, having purchased his partner's interest, he continued the business alone until 1859, when he occupied his present establishment. He is an active and public spirited man, and an energetic promoter of local enterprise. He has been a director of the Manayunk Fire Insurance Company since its organization, as well as an originator and a director, since its establishment, of the Manayunk Bank. In him the cause of education has an earnest advocate, and he has contributed to its advancement by effective service upon its Board of Control and in the local boards. He served in the State Legislature during 1866 and 1867, acquitting himself with dignity and credit, and leaving a blameless record.

JAMES WALLACE, son of the former, was born in Manayunk, October 1st, 1847, and, having been prepared in the public schools of his native place, entered the Central High School of Philadelphia, in 1862. Having graduated at Crittenden's Commercial College, in 1867, he entered his father's mills and assumed the charge of the books of the concern. Since being admitted to partnership, he has continued in the same capacity, beside assisting in the superintendence of all the practical operations of the mills.

WILLIAM SMITH, Iron Founder, was born in Staffordshire, England, February 19th, 1819. When only eight years of age, he drove a team for Green's iron foundry. During the year in which he was so employed, his leisure hours would be occupied in earnestly watching the operations of the moulders, who were preparing the sand, and producing the various shapes, preparatory to their receiving the molten metal. He expressed a desire to learn the trade, which request was granted, and at nine years of age he became an apprentice thereto. He served a term of seven years as a moulder in Green's foundry, Staffordshire. The same zeal and interest which he manifested at the commencement of his apprenticeship, he maintained throughout the whole of his term of servitude; and so far did he outstrip his fellow apprentices that, at the expi-

ration of his time, he had so pleased his employers, and won their esteem and respect, that they at once made him foreman of a gang of forty-five men in the foundry. The first work turned out under his immediate supervision was to fill an order of the British Government, consisting of castings for the Tower of London; and the Government Inspector of the work required him to have his name appear on the castings; they accordingly to this day bear his name. He remained at the works in the capacity of foreman for four years, when he was invited to take charge of the Bilston Iron Works, also in Staffordshire. This position he accepted, and occupied for two years, then returning, at the urgent request of his previous employer, to Green's foundry, and continuing with him during the remainder of his years in England. Having intimated his determination to emigrate to the United States, his employer sought to persuade him against the step, especially dwelling upon the obstacles he would have to encounter in a land where there was no money; for, at this particular period, a financial storm had swept over the land, paralyzing industries and bringing much distress among the laboring classes. Unable to change his resolution, he told him, on parting, that if he grew dissatisfied after his arrival abroad, or failed to procure employment, or was in danger of privation and suffering, to advise him at once of the facts, and he would remit him the necessary means to return to England, and that his old position at the works would be at his command at any time. This occurred in October, 1843. Immediately upon his arrival in the United States, he proceeded direct to Pittsburgh, the journey at that time being made by stage. Beside his little stock of clothing, he possessed but one English shilling. He immediately sought for and obtained employment in one of the mills as a helper, the wages being sixty cents per day. As his habits were very steady, and he was withal exceedingly prompt, he soon became an assistant, with an increase of pay. From the moment of his landing in America, he had been struck with the intelligence of the average mechanic, and he began to thirst after knowledge himself. While in England, he had grown up entirely devoid of education of any kind. Upon learning that an evening school was in session, he immediately applied, and by the aid of this, and other schools, at a subsequent period, he obtained what he sought for. Being very economical, he soon amassed a respectable sum of money, when his brother John suggested that they should go into business on their own account, to which he acceded. In 1850, while a member of the firm of Jenks, Painter & Co., he had occasion to go to Memphis, Tennessee, to superintend the erection of a large cotton mill at that city. So well pleased were its proprietors with his wonderful business qualifications, that they tendered him the position of superintendent, with a large salary. Desiring a day's delay to consider the matter, the proprietors, fearing his refusal, as a farther inducement, offered as a bonus his acceptance of a plantation and an ample supply of slaves. This "farther inducement" resulted in a flat refusal to accept the proffered position. Everything savoring of serfdom was distasteful to him, and he returned to Pittsburgh. During the early and dark days of the Rebellion, in 1861, when the insurgents were about to invade the city of Washington, he addressed a letter to the Secretary of War, tendering the Government the use of his entire establishment with all its machinery; that if the latter were successful, they might compensate him, if they judged it expedient to do so; but in the event of a failure to conquer, he was willing to go down with the Union. The Secretary of War, in reply, thanked him on the part of the United States, and accepted his generous offer; and for three years and a half thereafter its operations were conducted by the United States Government. He is a resident of Alleghany City, and he has served both in the Common and Select Councils continuously from 1852 to 1868. When the National Trust Company was first organized, he was chosen one of its directors, which position he yet retains, besides being actively connected with the United Savings Bank; Second National Bank, of Alleghany City; Sharpsburg and Etna Savings Bank; Pennsylvania Insurance Company; Enterprise Insurance Company; Life Association of America; Consolidated Gas Company, of Pittsburgh; Sharpsburg and Etna Gas Company; Isabella Furnace Company; Cascade Ore Company; and the Escanaba Furnace Company, of Lake Superior.

BECKLER'S MALT HOUSE AND BREWERY, Philadelphia.—As early as 1848, the site of this establishment, Northwest corner of Eleventh and Oxford streets, was occupied by Andrew Wirth and Frederick Schaffer, who manufactured lager beer in limited quantities, in a small building thereon, the work being done by hand, and the products being, to a considerable extent, sold from the hotel at the corner of the streets. There were also dwelling houses on the premises, occupied by members of the firm. It afterward passed into the

hands of William Gaul, from whom it was purchased by the present proprietor, in 1860. He employed George W. Burkhardt to convert the works into an ale brewery, which was managed for him by his brother-in-law, Xavius Beckler, until 1863, when he himself assumed the management. He commenced operations with a force of fourteen men, and consumed daily about 100 bushels of malt, producing about 12,000 barrels of ale per annum. He began malting in 1866, and continued both establishments until 1870, when he leased the brewery to A. Ballon, and devoted himself exclusively to the manufacture of malt. Ballou relinquished the brewery after operating it about two years, and it was untenanted until June, 1873, when all the buildings, except the malt house, were demolished, and in their stead there arose a magnificent six-storied brick building, with fronts of 60 feet each on Eleventh and Mervine streets, and 175 feet on Oxford street. A roadway, extending lengthwise under and through the centre of the building, separates the two departments and affords unusual facilities for handling materials and products. The grain, having been received from the Eleventh street entrance, is deposited in the basement, thence to the hopper, whence it is conveyed by an elevator to the upper floors, to be "steeped" in large vats containing cold water, and capable of holding about 300 bushels each. After being sufficiently steeped, it is transferred to the capacious germinating rooms, having ceilings some seven feet high, where it is heaped up until germination has fairly commenced. It is then spread upon the floors in large lots, containing about 150 bushels each, and generally three lots upon a floor; there are seven floors used for germination, and each lot passing to the kiln, at the further end of each floor, is replaced by another. The barley remains spread upon the floor for about ten days, being turned over every few hours; and, after being dried in the kilns, is placed in large bins, where thousands of bushels are generally kept to meet the demands of brewers. About 160,000 bushels of malt are produced per season of about eight months. The new building having been completed by C. C. Carman, the lager beer brewery was put into operation October 1st, 1873, under the firm name of W. & L. Beckler, two sons of the proprietor, for whom it is destined. It contains every possible convenience: all the modern improvements and the best machinery, which enables the proprietor to accomplish as much with twenty-one hands as with three times that number under the former method. The spacious cellars have floors laid in cement, with grooves for complete drainage, and each is furnished with an ice house, to produce the low temperature required for the storage of beer. A fine spring of the purest and softest water, on the premises, affords an abundant supply and ensures a superior article of beer. The "fermenting" room is one of the cleanest and best arranged in the city. The motive power is derived from a twenty-five horse engine, and boilers sufficient to furnish steam for thirty-five horse more. The brewery consumes about 400 bushels of malt per day, and the annual productive capacity is rated at 35,000 barrels. The quality of the beer here manufactured is fully equal, if not superior, to the celebrated Milwaukee Beer.

IGNATZ BECKLER was born in Bavaria, Germany, June 18th, 1825. His educational advantages were rather limited, but he was too earnest and energetic to be deterred by such a disadvantage, and has taken his rank among the self-educated men of our day. At the age of fifteen, he entered Louis Kreamer's brewery, in Munich, where he remained nearly three years, going thence to Hocker's, in the same city, and shortly to another in the city of Augsburg. Subsequently, he repaired to Memmingen, Bavaria, where he worked in several breweries, thus acquiring a perfect knowledge of the various processes. He emigrated to the United States in 1846, first sought employment at Bethlehem, Pennsylvania, and, after various employments, became a cellarman in Rodman's brewery, in 1847. In 1849, he obtained a similar position in the establishment of G. W. Gray, where he continued fourteen years, rising through all the grades and reaching the position of foreman. His long experience in these leading establishments eminently qualified him for the responsibility he assumed at his present location, in 1863.

ASAPHA MILLS, Chester, Pennsylvania, A. Blakeley & Sons, Proprietors.—In 1854, John Larkin erected, in Chester, a substantial three story brick building, 100 by 45 feet, and in September of the same year it was put into operation for the production of tickings, stripes, and denhams, by Abraham Blakeley. He associated with him his son, Benjamin W. Blakeley, January 1st, 1860, under the firm name of A. Blakeley & Son, and this firm continued to operate until January 1st, 1874, when a second son, William S. Blakeley, was admitted, and the firm assumed its present style. In 1873, A. Blakeley & Son erected an additional

three story mill, 102 by 55 feet, beside a finishing room, 40 by 30 feet, and other necessary outbuildings, offices, etc. It was then almost entirely refitted with new and improved machinery, including about 24 carding machines, 158 looms, and about 5788 spindles, with all the requisite preparatory and finishing machinery. The improved labor saving machinery enables them to operate with a force of 150 hands, and a monthly pay roll of something over $4000. Power is obtained from a fine Corliss steam engine of 150 horse power, supplied by three sets of tubular boilers. The original production is still continued, and they will turn out about 8000 yards and 1400 pounds of yarn per day.

ABRAHAM BLAKELEY was born in Yorkshire, England, July 5th, 1806, and is almost entirely self-educated, having entered the cotton mills at Staleybridge, Lancashire, in 1816, and remained there until he came to the United States. He landed in Philadelphia, May 29th, 1828, and for two years subsequently worked at hand loom weaving in Germantown. In 1830, he went to Schuylkill county, where he sought employment in the mines, etc., until 1833, when he engaged with John P. Crozer, at West Branch. He soon rose to the position of foreman, and held his position for nearly ten years. At the close of 1846, he associated in partnership with Phineas Lownes, as Lownes & Blakeley, and the new firm embarked in the manufacturing business at Knowlton, January 1st, 1847. Having disposed of his interest to J. William Lewis, in the autumn of 1853, he removed to Chester in March following. He received as special partner Dr. Bonsall, and embarked in the present enterprise; but, in 1857, he purchased his partner's interest and operated alone until the admission of his son, and has continued as the financier of the firm. He is a public-spirited and progressive man, and during the war was an ardent supporter of the Union cause, participating in the Gettysburg campaign, in 1863.

BENJAMIN W. BLAKELEY was born at West Branch, Delaware county, Pennsylvania, January 9th, 1837. He attended the common schools, and finally graduated at Crittenden's Commercial College. Having entered his father's mill at the age of sixteen, he thoroughly mastered the business in all its details, and, being admitted to the firm, became and continues the practical manager.

WILLIAM S. BLAKELEY was born at Knowlton, March 28th, 1853. After due preparation, he entered the Pennsylvania Military Academy, whence he graduated C. E. in 1872. He then devoted his close attention to his father's business, keeping the books and accounts, and subsequently becoming a member of the firm.

VAN GUNDEN & YOUNG'S Marble Works, at No. 1221 Spring Garden street, Philadelphia, were originally established by John Baird. They were long and favorably known to the community, and enjoyed a first-class reputation for good workmanship on the very best materials. In 1871, he disposed of his interest in the establishment to the present proprietors, and retired to private life. Both members of the present firm are practical marble workers, who had already become well-known while conducting a smaller business at No. 1357 Ridge avenue, and now that they have acquired possession of the present site, their business prospects have materially improved. The operations at the works embrace every variety of monumental fabrications. The establishment gives constant employment to fifty hands, and the value of the articles manufactured is over $125,000 per annum. The artistic excellence of the work finished at this locality is universally admitted to be unsurpassed by any other of the many similar establishments in the city, and to this fact is to be ascribed the rapidly increasing business of the firm. The senior partner attends personally to the selection and purchase, in Europe, of the various materials required, especially the Scotch granite and Italian marble, large quantities of which are imported by the firm for the prosecution of their business. Among the many elegant monuments recently constructed may be mentioned that to the memory of the late Sigmund H. Horstmann; and also the one designed to mark the resting-place of the late William B. Schneider, Grand Tyler of the Grand Lodge of Pennsylvania. The "Soldiers' Monument," placed by the State in Beverly, New Jersey, was likewise constructed at these works; it is about fifty-four feet high, and is at once graceful and imposing.

CHRISTIAN VAN GUNDEN was born near the city of Berne, Switzerland, February 22d, 1825, and came to America with his parents when about seven years of age. After acquiring the trade of a marble mason, he started in business on his own account in the year 1861, at No. 1357 Ridge avenue, where, three years later, he was joined by Ephraim Young, and continued at that locality under the

firm of Van Gunden & Young until 1871, when they purchased the works first above described.

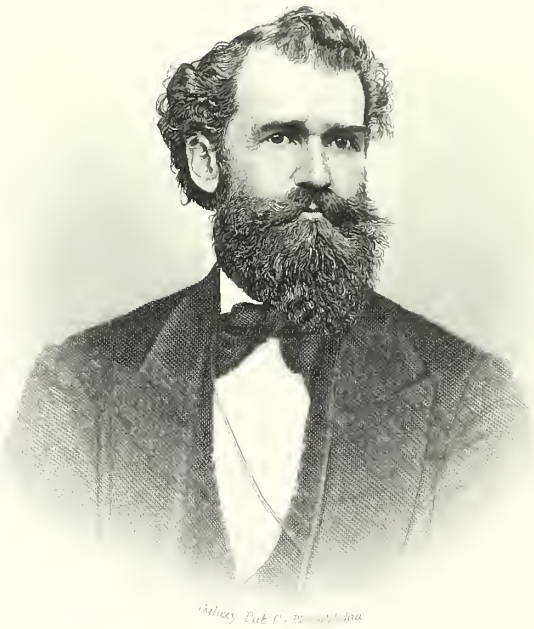
EPHRAIM YOUNG was born in Ireland, August 22d, 1833, of humble parentage. His education was but of a limited character, confined exclusively to the country schools. When about sixteen years of age, he emigrated to the United States, and entered, in June, 1850, the establishment of John Baird, in Philadelphia, to learn the trade of a marble worker. Having served out the period of his apprenticeship to the business, he continued in the same manufactory as a journeyman for six years, giving entire satisfaction to his employer, as he had become a complete master of his trade. In 1864, as above noted, he entered into co-partnership with Christian Van Gunden.

VARIETY IRON FOUNDRY, Lancaster, Pennsylvania, R. Blickenderfer, Proprietor. This foundry first commenced operations in 1837, under the management of Pennel & Lanehart, who operated it as iron founders and machinists. It next passed into the possession of Elisha Geiger, who converted it into a stove foundry and general jobbing shop, and subsequently he disposed of it to Marshbank & McConkey, who continued it until July 1st, 1867, when the present proprietor purchased the concern and changed it to its present purposes, turning out all manner of castings, iron railings and doing a general jobbing business. During the period when Pennel & Lanehart operated it some very heavy works were constructed here, the large steam engine that supplies the motive power to the Conestoga Steam Mill, No. 1, being a specimen of their skill. It is reliably stated that the second locomotive engine that ran on the Pennsylvania Railroad was constructed in this establishment. When the present owner first took possession of the foundry, he employed about eight men, and with this limited force he produced a large amount of work. At the present time the working capacity of the establishment has been largely increased, and the hands regularly employed are thirty men. About 500 tons of iron are consumed yearly. The proprietor has introduced into the foundry some of the latest improvements in machinery, and is largely engaged at present in the manufacture of "Bender's Improved Hand Fan," for blacksmiths' fires, and disposes of them through all sections of the country, the demand being fully equal to the supply at all times. He is a practical mechanic and has given his entire attention and time to the management of his works, superintending in person the minutest details and allowing nothing but the very best character of work to leave his establishment. Hence he can command an advantage over all competitors in the same line of business for his productions. To this fact is attributable his successful operations and the very flourishing condition of his foundry at the present time.

RICHARD BLICKENDERFER was born at Litiz, Lancaster county, Pennsylvania, February 3d, 1841, and is the fourth son of Henry Blickenderfer, an old resident of the county. When eight years old he removed with his father to Lancaster, where he received his education in the common schools of the city. At the age of nineteen years he commenced to learn the trade of a cabinet-maker, and served until the breaking out of the Rebellion, when he enlisted in the 79th Regiment Pennsylvania Volunteers, in which he served with distinction, participating in several severe engagements. He was wounded at the Battle of Chaplin Hills, Kentucky, and was discharged from the service in consequence thereof. After recovering he re-enlisted in the 3d Regiment Pennsylvania Heavy Artillery, and was assigned to the 188th Regiment Pennsylvania Volunteers, in the Army of the James, where he served until the close of the war, when he was honorably discharged. After returning home he apprenticed himself for one year to a pattern-maker, which gave him a knowledge of his present business and enabled him to embark in his enterprise successfully. He is an active member of the order of United American Mechanics, and is also a member of the Masonic fraternity. He was married, in the fall of 1865, to an estimable lady of Lancaster county, and is now in the enjoyment of a comfortable competence and surrounded by a happy family.

THE PITTSBURGH CAST STEEL SPRING WORKS, Aaron French and Calvin Wells, Proprietors, trading as A. French & Co., are situated on Liberty street, in the city of Pittsburgh, and extend from Twentieth street to Twenty-first street, and back 120 feet to Spring alley, occupying exactly half a square of ground, and being completely surrounded by public thoroughfares. Their works, which are the largest of the kind in the United States, and among the largest in the

Manufacturers of French & other Elliptic Springs for Rail Way Cars &c. Philadelphia.



A. French.

world, are capable of turning out twenty tons of finished railroad car and locomotive springs per diem. The concern was started in 1865, by Aaron French and five associates, under the name of the Hazen Light Steel Spring Company, occupying a small building on Liberty street opposite the Union Depot, and employing not more than a half dozen of hands. The original capital was $6000, but the project succeeded so poorly that, at the expiration of eighteen months, not only was this amount entirely absorbed, but also a debt of about $10,000 had accumulated. At this trying period A. French and C. Wells succeeded to the whole business as equal partners, changing the name of the establishment to that of the Pittsburgh Cast Steel Spring Works, assuming the debts of the defunct concern and investing fresh adequate capital. The former was a skilful mechanic, and by numerous inventions in machinery for the purposes required, and a close study of the philosophy of proportions, rapidly brought the manufacture of elliptic springs to great perfection, entirely revolutionizing the business in fact and producing an article that, with a third of the ordinary weight, answered the same purpose as the ponderous and unwieldy springs formerly in use. C. Wells, who had an extensive acquaintance with the steel and iron trade, assumed the responsibilities attached to the financial department, and in a remarkably short time the new management proved a decided success. In 1869, the works were removed to their present location and were steadily increased in capacity until, in 1872, their production amounted to $650,000, employing nearly one hundred hands. Their grounds are almost entirely covered with substantial buildings, and the appointments of the shops are very complete, containing twenty-nine furnaces, eight blacksmith fires, a large steam-hammer, three steam "drops," also lathes, centring machines, drills and other machinery, all of which are worked by a perfectly adjusted system of shafting. The steel is tempered by a patented process, and before leaving the shop each particular spring is subjected to a hydraulic test. Depending exclusively for their patronage on the railroads of the country, these works have consequently been directly affected by the panic which prostrated railroad business in the fall of 1873, and during the present year the production will be beneath the maximum; but fortunately the firm is in a situation to sustain the decrease in trade. It is a noteworthy fact that this establishment has recently supplied the springs for the Pullman Palace cars used on the European railways, a flattering tribute to the value and efficiency of American mechanical ability and to its appreciation in the Old World, where this and kindred industries have long led the van.

AARON FRENCH was born in Wadsworth, Medina county, Ohio, March 23d, 1823. His parents were Philo and Mary (McIntyre) French, who came to Ohio from the vicinity of Springfield, Massachusetts. His preliminary education was acquired in the public schools, and a higher course of studies was completed in an academy at Wadsworth. His father dying while he was in his childhood, he was early compelled to earn his own subsistence, and, at the age of fourteen, was apprenticed to learn the trade of blacksmith. Subsequently he moved to the South, while in his twenty-first year, and later was engaged in the blacksmith department of the Cleveland & Pittsburgh, and Cleveland & Columbus Railroads. In 1855, he removed to Wisconsin, in order to assume the supervision of the shops of the Western Union Railroad at Racine. In 1862, he was elected Sheriff of Racine county, and remained in that place until 1864, when he moved to Pittsburgh. His first wife, Emphrasia Tyrell, of Liverpool, Ohio, to whom he was married in 1848, died in 1870, leaving four children—one son and three daughters. December 27th, 1871, he was married to Carrie B. Skeer, of Chicago, Illinois.

LANCASTER PLANING MILLS, Urban & Burger, Proprietors, Lancaster, Pennsylvania. This establishment was first organized in the spring of 1872 by A. S. Urban and Henry Burger, who entered into partnership together, and purchased the interests and good-will of the business carried on by Herr & Eshleman, together with all the machinery then used by them in their sash and door mill on Beaver street. On March 15th, in the same year, Urban & Burger purchased a lot on South Prince near Andrew street, and commenced to erect the building at present occupied by them, which is a substantial brick edifice, fifty feet square and three stories high, with the necessary outbuildings for the storage of material. In the following month of July, the machinery was removed from the old shop, where operations had been carried on temporarily, until the present mill was under roof, which is much larger and better adapted to their largely increasing business. The most approved labor-saving machinery that can be obtained has been placed in the mill, which is propelled by a

"Supplee" engine of twenty-horse power. At the commencement of the enterprise, some fifteen hands were employed, and the value of articles manufactured during the first year was estimated at $40,000. Since that date, the products have increased about twenty per cent. annually, while the services of twenty-five men are now constantly required. The manufactures of the firm embrace doors, sash, blinds, shutters, mouldings, brackets, and other house-building materials, church furniture, and every variety of wood-work. These several articles find their way to every part of the country, while seven-eighths of the work required by Lancaster city is supplied by this firm. They attribute their success in their line of business to the fact that they are both practical mechanics, being thoroughly conversant with all branches of the trade, in the most minute details, and permitting nothing but the very best work to leave the mill, at the same time employing none but the best of material and the most skilful workmen. Both members of the firm have developed a remarkable degree of enterprise and business tact in building up this establishment and giving it its present prosperity and high standing in the community.

A. S. URBAN was born in Lancaster county, Pennsylvania, August 2d, 1838, where he received his education in the common schools of the district. When seventeen years of age he became an apprentice, and learned the carpenter's trade, faithfully serving his employer for four years. After the expiration of the time for which he was indentured, he continued as journeyman in the same shop, at intervals for about six years more, and up to the time when the Rebellion broke out. During the war he served with the 195th Regiment Pennsylvania Volunteers, and at the close of hostilities was honorably discharged from the service. On his return, he settled in the city of Lancaster, resumed his former calling, and became a journeyman in the planing mill of Swertzwelder & Morrow; subsequently he was employed in Locher's planing establishment, there remaining until 1868, when he entered into partnership with J. W. Byerly, and they started the business on their own account. The firm lasted but one year. He next joined a colony, and, in 1870, emigrated to Kansas, with the view of settling there, and opening up the trade; but the inducements were not of the most flattering character, and after a limit d sojourn in the Far West, he resolved to return to his old home in Lancaster. He now connected himself with Eshleman & Herr as foreman in their planing mill, and remained with them until 1872, when he entered into business as above narrated. As an evidence of his perseverance and determination to succeed, it may be stated that his original cash capital on starting business was but $300, and yet from this germ has been developed a product of $50,000 per annum. He has been for several years a member of the City Councils of Lancaster, in which body he has served with distinction. He is also a prominent member of the Knights of Pythias. He was married in 1861 to a very estimable lady of the county.

HENRY BURGER was born in Nassau, Prussia, September 20th, 1839, where also he was educated. When fourteen years old he was apprenticed to a trade in his native place, and continued there until 1856, when he emigrated to the United States. Immediately upon his arrival in this country he went to Lancaster city, and was employed as a journeyman with Adam Burger, in the carpenter trade; with him he remained three years; but having a desire to see something of the country, and to become better acquainted with the details of the trade, he was led to move from point to point, working in Baltimore, Virginia, and also in Philadelphia. This brings up his history to the time when he commenced business, in 1868, on his own responsibility, as a contractor and builder; in which vocation he continued, until he entered into business relations with his present partner. He has reached this his most successful position entirely by his own exertions, his own industry, energy and perseverance being the only capital on which to rely for his ultimate advancement. He is an active and prominent member of the several orders of Odd Fellows, Druids, and Red Men. He was married at the age of twenty-one to a lady, a native of Bavaria, and has now a family of four children, and is settled in Lancaster city.

LEMAN'S RIFLE WORKS, Lancaster, Pennsylvania, Henry E. Leman, Proprietor. This business was commenced by the present owner of the works in July, 1834, being started on a very limited basis in a portion of a brewery building on Leman's alley, where, with only the assistance of a boy, he engaged in the manufacture of rifles. Having succeeded in making a first-class article, and finding the premises inadequate to meet the wants of his rapidly increasing custom, he removed in the spring of 1837 to a building on Duke street near Walnut, formerly used by the stage company,

and there remained thirteen years; he then built on the corner of Walnut and Cherry alley—making up a period of thirty-five years in that location; and during this long time he was steadily engaged in his vocation, personally superintending the work in all its details and reaping the reward of his industry. In July, 1872, he removed to his present works on James street, at the corner of Christian, on which he had purchased a substantial brick building, two stories high, and measuring 96 by 105 feet, which is amply provided with every facility for the successful prosecution of the business. The working force of the establishment is from sixty-five to seventy hands, and the production averages 600 rifles monthly. Every portion of a rifle, especially the barrel and lock, is here carefully and scientifically made, and nothing but a first-class article is finished. The establishment has won a reputation for itself and its proprietor, in the construction of the very best arms, second to none in the country. The business is principally confined to the sportsman's trade, and the goods find a market in every part of the country from the Canadas to the Gulf and from the Atlantic to the Pacific. He also has supplied the Indian trade with arms for a number of years under Government contract. Previous to the Rebellion he enjoyed the advantage of a large trade with the South, which was entirely lost during the continuance of the war; but he has regained the lost ground and has renewed his dealings in that section. While having in view the value of money and the accumulation of a competence, the proprietor has been careful to demand only a reasonable profit on his wares; consequently, the business public has ever had the utmost confidence in his integrity. The secret of his success in life lies in his indomitable will and energy in the prosecution of his vocation, as he was his own foreman and clerk during the early stages of his business, and never allowed anything to be placed in the hands of a workman until carefully scrutinized as to its quality, or any waste of material to go unpunished.

HENRY E. LEMAN was born in Lancaster city, Pennsylvania, March 8th, 1832. His ancestors came to this country in 1711 and were Huguenots. His father was a native of the same county, and served for three years in the Revolutionary War. He was educated in the private schools of his native city, there being at that time no public school system in Pennsylvania. At the age of sixteen years he was apprenticed to a gun-smith in Lancaster, with whom he remained for three years, and then proceeded to Philadelphia, where he labored as a journeyman until he was twenty-two years old, during which periods he acquired a full knowledge of the manufacture of a superior character of arms. He now returned to Lancaster and engaged in business on his own account, as above narrated. At the present date he is amply able to retire from business; but an active temperament, and a desire to supply employment to workmen, induces him to continue his manufactory. He has served as a member of City Councils for a number of years. He was married, in 1851, to a very estimable lady of Newburg, New York.

LANCASTER CARPET, COVERLET, QUILT AND YARN MANUFACTORY, Philip Schum, Proprietor. In this establishment is carried on, not only the fabrication of the above-named articles, but also flannels, blankets, and counterpanes. The enterprise was commenced in 1856, on a very limited scale, a small dwelling on Dorwart street being rented, and provided with the necessary appliances for the weaving of quilts. But one man was employed in addition to the proprietor himself, and the production was about 175 per month, being generally custom-work. After continuing there about three years, in 1862, he built a manufactory at the corner of South Water and Strawberry streets, the lot being 54 feet on the former, with a depth of 120 feet. On this a substantial brick building, two stories high, was erected, measuring 120 feet in length and 30 feet in breadth. It was supplied with all the necessary machinery for the manufacture of blankets, flannels, and coverlets, in addition to quilts. Four looms were introduced, and eight men were now employed. The production correspondingly increased, and, indeed, augmented so unceasingly as to necessitate a still further enlarging of the manufactory. Accordingly, in 1868, an additional brick building, 27 feet by 30 feet, was built; also a new dye-house, measuring 25 feet by 40 feet, and an additional lot of ground, 83 feet by 120 feet, whereon to erect these buildings, was secured. A frame building, 16 feet by 25 feet, adjoining the factory, was also purchased and added to the establishment. The looms now put up were twenty in number, requiring the employment of forty hands. At this time there are woven about 400 quilts per week, also some 500 yards of carpets; in addition to these, large quantities of yarns, blankets, and flannels are manufactured. The motive power is furnished by an upright engine of five horse power, and one of Best's

improved boilers. The proprietor, still finding his business largely increasing, and being unable to furnish the supply commensurate with the demand, conceived the idea of starting a woollen mill separate and distinct from the town establishment; and, in 1864, purchased from George Levan a stone mill, two stories high, situated in New Mill Town, Lancaster county. The property embraced ten acres of ground, and two frame dwellings in addition to the mill. He furnished the factory with one Jack of 240 spindles, three corders, one picker, one twister, one reeler and waste-duster; the motive power being water. The monthly consumption of wool was 3200 pounds, in the manufacture of yarns. Since the starting of this mill, the machinery has been considerably increased, and so has also the working force. The productions have also augmented to the extent of twenty per cent. The proprietor of these enterprises is a practical mechanic, having learned his trade in all its details, and has always devoted his entire attention to business. Being strictly conscientious in character, he has confined himself to the production of first-class goods, and employs nothing but the best of materials. He attributes his success to the above fact, and moreover to the personal supervision which he gives to his business, himself laboring, in the midst of his employés, as earnestly and faithfully as the rest of them. His son, John E. Schum, is now associated in the business with him, and promises to do much toward the rapid development of the trade; and will, at no distant day, assume entire management of the business.

PHILIP SCHUM was born at Grosherzogthum, in the Grand Duchy of Hesse Darmstadt, Germany, October 25th, 1814, and received his education in the schools of his native town. At the age of fourteen years, he was apprenticed to learn the shoemaker's trade, at which he labored for six years; but being dissatisfied with the same, served for one year at basket-making. According to the custom of the country, being now of age, he started to travel, working at his trade from time to time, remaining long enough in one locality to accumulate enough funds to enable him to reach some other point. (From this mode of procedure, still in vogue in Germany, it may be stated, arose the term of "journeyman.") He passed about four years in this manner, at the expiration of which time he returned home, and commenced shoemaking on a small scale, having married a townswoman, May 2d, 1839. He continued at his trade until the spring of 1844, when he emigrated to the United States with his family. On his arrival in New York, he found his means were little or nothing, and was obliged to hire out as a "malt-tramper," and by practising the severest economy accumulated sufficient funds to move his family into the interior. He finally settled in Lancaster county, about two miles from the city, first working as a day laborer, next at shoe and basket making, then kept a small store, which he eventually relinquished in 1856, when he commenced his present business of weaving as above narrated. He is now in the possession of a most prosperous business, and has accumulated a handsome competence, being the owner of all the mills now operated by him, and this property is wholly unincumbered. To his indomitable perseverance in the prosecution of his business is entirely attributable his great success. He has been often importuned to serve as a member of City Councils, but has invariably declined being a candidate. He is a stockholder in the Lancaster Fire Insurance Company, the Lancaster Hotel Company, and the Germania Life Insurance Company, besides being largely interested in the German Building and Loan Association.

CONESTOGO WOOLLEN MILLS, George Levan & Co., Lancaster, Pennsylvania. These mills are the result of an enterprise commenced over thirty years ago by the senior partner, who, on April 1st, 1844, first rented a small factory in the eastern part of Lancaster county, near Leman Place, where he commenced business on a very limited scale, having only a set of small cards and a few looms. Possessing but little or no cash capital, he supplied this deficiency by his own industry and energy, and, giving employment to three hands, he successfully carried on the manufacture for six years, confining himself almost exclusively to custom work. At the expiration of this period, he purchased a mill of similar capacity near New Holland, where he continued for five years, during which time he increased the working capacity of the mill. In the spring of 1857, he associated himself with D. Overholtzer, and erected a new mill at Wabank, near Lancaster, which was considerably larger in every respect than his previous works. This mill he assisted to operate for six years, and early in 1863 he disposed of his interest in the same to his partner; and subsequently, in connection with several other parties, erected on North Prince street, in Lancaster city, a steam woollen mill, in which he was interested until 1871, when another mill was built on the Conestoga river, adjoining

the city, which the present firm now controls. This firm was formed in 1868, and consists of George Levan and his son, S. L. Levan. The Conestogo Mill is of that description termed by manufacturers a "three set mill," and 95 feet in length, 40 feet wide and four stories high, built of brick, and operated by water power. There are about twenty hands employed therein, and the product is about 10,000 pounds of yarns per month. Two classes of yarns are made in this establishment: one, known as "single yarn," is used in the manufacture of flannels, and finds its market in Philadelphia; the other grade is "knitting yarn," and is sold throughout the State. The success which has attended the firm since its inception has been attributable to their determination to produce none but the very highest grade of goods, as they use nothing but the most superior material. The mill maintains a most enviable reputation throughout the State for the excellent character of its productions, and particularly as regards the knitting yarn, for which the demand is constantly large. The firm also owns and operates the Conestogo Flour Mills.

GEORGE LEVAN was born near Kutztown, Berks county, Pennsylvania, February 7th, 1817, and is a son of Peter Levan, one of the oldest and most respected settlers of that locality. His education during his early years was but imperfectly attended to, there being no English school nearer than four miles to his father's residence. When twelve years of age he was apprenticed to Samuel Antrim to learn the trade of woollen manufacture, and very soon afterwards removed with his employer to Hinkletown, Lancaster county, where he continued the trade, devoting all his leisure time to the acquirement of an education. He served five years with Mr. Antrim, and at the expiration of that time was employed by Henry Bard (the successor in the business) in the same mill as a journeyman. In this capacity he remained four years, and then assumed the management of the mill on his own responsibility, renting the property from Henry Bard. Here he continued for a year, engaged principally in the manufacture of country custom-work. In consequence of some difficulties regarding the water-power, the mill suspended operations in 1839. He then removed to Ephrata, Lancaster county, and served with Samuel Bowman as a journeyman for one year; in 1840, he rented the mill for a term of four years, and was engaged in the same line of business—that of country custom-work. The lease of this mill was made on little or no capital; but by a steady application to business and a careful attention to the wants of his customers, he was enabled to increase his facilities and enlarge his operations, so that when the lease terminated he was possessed of considerable capital and had already manufactured goods which commanded a ready market. He then rented a mill near Lemon Place, as already detailed, and he is now at the head of one of the most flourishing manufactories of woollen yarns in the Commonwealth. He is a Trustee of the State Normal School at Millersville, and a stockholder in that institution; also a stockholder and director in the Lancaster Fire Insurance Company. He was married, May 11th, 1843, to Nancy Landis, of Lancaster county, and is now a resident of Lancaster city, enjoying the fruits of an economical and persistent business career, still remaining at the head of his flourishing manufactories, and managing their details with that care which has heretofore marked his course.

CONESTOGO FLOUR MILLS, Levan & Son, Proprietors, Lancaster, Pennsylvania. The site of this mill previous to its purchase by the present owners was occupied by an extensive saw-mill. In 1870, George Levan and his son, S. L. Levan, purchased the entire property with the view of changing the business, and immediately commenced a demolition of the old building, erecting in its stead a large brick mill, 65 by 40 feet, three stories high, with a basement. This was built in a most substantial manner, and filled with machinery and other appliances of the most approved description, for the production of a first-class grade of flour; the motive power is water and turbine-wheels. The mill went into operation towards the close of 1870, and averaged then 500 barrels per month, with an operative force of only three men. The very superior quality of flour made in this mill was at once recognized, and the demand steadily increased, necessitating an augmentation of machinery and additional water-power. These were supplied from time to time, and the present capacity of the mill exceeds 2000 barrels per month. The especial brand which claims the attention of the market is that known as the "Limestone," and is eagerly sought after in Philadelphia. A firm adherence to strict business principles, and the production of a superior article of flour, entitles this mill and its proprietors to the first position of flour manufacturers in the country. The firm are also the owners and operators of extensive woollen mills, an account of which will be found in the present volume.

THE CONESTOGO STEAM MILLS, No. 1.—F. Shroder & Co. (F. Shroder & G. W. Arnold), Manufacturers of Fine Shirtings, Fine Jeans and Nankeens. The establishment was a stock organization at the beginning. The first meeting of stockholders who contributed to its start was held July 11th, 1845, at the public house of Peter Reed, in the city of Lancaster. A site for the mills was located on Prince street, bounded by North German and South Conestoga, and fronting on Prince. On the same day of the meeting of stockholders the following managers were elected: John F. Steinman, Edward Warren, James Evans, David Longnecker and Christopher Hager, with John F. Steinman, President, and David Longnecker, Secretary. Building was commenced at once and advanced rapidly towards completion; machinery was introduced in the spring of 1846, and during the winter of 1846 and 1847 the mill was completed. Early in March, 1847, operations were commenced in the production of heavy brown sheetings. The buildings consist of main factory of brick, 200 by 50 feet, four stories and attic; engine and boiler house, 50 by 30; office and packing house, 25 by 75, and picking house, 50 by 50. The force of hands employed numbered about 200, producing an average of 185,000 yards per month. The motive power was two 100 horse power horizontal engines, built in the establishment of Pennell & Lanehart, Lancaster city. The main shafting and gearing was also of Lancaster manufacture. General Charles T. James, a prominent manufacturer and engineer of Massachusetts, was brought on to manage the erection of the mill, and after its completion and start it was found to operate so successfully, and Lancaster was deemed by the far-seeing General James to be a prominent manufacturing place, that he made a proposition to capitalists, in 1848, to assist him in the erection of another mill, which was promptly done, and was called Conestogo Mill, No. 2. It was completed and put in successful operation in 1849, making sheetings, cotton flannels and drills; the two mills were under the management of A. R. Fiske at this time. These enterprises more than fulfilling the most sanguine expectations of their projectors, a proposition was made by the same enterprising spirit, General James, to build a third mill, which was also promptly done, and in 1850 work was commenced, and early in 1851 the mill designated No. 3 was put in operation in the manufacture of print cloths. These three mills were all under the one management of the Conestogo Steam Mill Company, and employed about 700 hands and produced an average quantity of 000,000 yards monthly. In 1851, A. R. Fiske retired from the management, and S. S. Spencer was placed in entire control of the three establishments as Superintendent. The mills continued to be run under the consolidated management until early in spring, 1855, when, by a mutual agreement of the stockholders, the organization was changed and three corporations were made out of the original one. The stock was divided into three equal parts, and the holders of each took a mill. From this division arose the distinctive titles of Nos. 1, 2 and 3.

MILL No. 1 was operated then by the organization called the Conestogo Steam Mill Company, F. Shroder being President, and so continued until the financial crash of 1857, when it was sold to F. Shroder & Co., the firm consisting of F. Shroder, Benjamin Snavely, Christian Brenneman and G. W. Arnold. It is now operated by the same organization. The production has increased about 75 per cent. on its original capacity. The combined horse power of the engine is about 250. The equipment of the mill is about 11,000 spindles, 275 looms and necessary preparation, and the operating force is 325 hands, producing 285,000 yards of fabric monthly. F. Shroder personally attends to the management of the mill, and its success is mainly due to his executive capacity. The product of this establishment is of the very first quality, and commands the highest market figures.

MILL No. 2. In the spring of 1855, when the original organization was changed, Mill No. 2 came into the ownership of David Longnecker, and was managed and operated by S. S. Spencer, who retired from the management of the other mill and devoted his entire energies to the development of this one. This ownership continued until the fall of 1857, when a sale was made to John Farnum & Co. and General Robert Patterson. Farnum & Co. operated the mill under lease of Patterson's interest until 1865, when they bought him out, and John Farnum became the sole owner. In 1867, he also purchased Mill No. 3, and operated both under S. S. Spencer's management; he still continues to operate both mills, or rather his heirs, who came into possession of them at his decease, in 1872.

MILL No. 3, at the time of change in management, in 1855, came into possession of the Conestoga Steam Mill Company No. 3, with A. W. Russel, President, and O. W. Gilbert, Treasurer, and was operated by them until the crash of 1857, when it was sold at private sale and came into the possession of Shenk, Bausman, Carpenter & Co. They

operated it until 1867, when it was sold to John Farnum & Co., and has since been operated by him, in connection with Mill No. 2, up to the present time.

CONESTOGA CORK WORKS, Mrs. Mary S. Cadwell, Proprietress, Manufacturing Corks of All Sizes. These works were first located at the southeast end of Lancaster, on the banks of the Conestoga, and consisted of a three story stone building, 30 by 60, only one floor of which was used for cork-making—the balance being used as a manufactory for cotton fabrics. The motive power was water, old style under-shot wheel. The style of the firm at that time was Cadwell & Co., the members being Cadwell, Crocker and Boardman. They began with one tapering machine and three blockers, on a limited scale, working only about ten hands, producing about 2100 gross corks per week. Starting in 1858, they continued business at that place until April, 1869, when the manufactory was destroyed by fire. A building was temporarily rented on South Queen street, in the rear of the *Express* Company's printing office, and work continued there until November following, when again the destructive element, fire, consumed the entire place, machinery, stock and all. In January, 1870, immediately after the first fire, the partnership was dissolved by the retirement of all except J. Cadwell, who assumed sole proprietorship, and in a most persevering and successful manner pushed the work, notwithstanding the unfortunate reverses by fire the second time. The present factory was commenced immediately after the second fire and speedily urged to completion, and was occupied early in January, 1870. Its location is a lot fronting on Locust, near the corner of Lime; the buildings cover the whole front, are 90 feet by 50 feet in depth, with office and boiler house in rear, 15 by 20, and necessary outbuildings for the storage of materials. The motive power is supplied by a 20 horse power engine, Diller pattern, with a boiler of about 25 horse power. The machinery is of very novel construction, consisting of blockers, slicers and tapering machines. The blockers cut the corks to the proper dimension; the slicers cut the wood into strips ready for the blocking operation, and the tapering machines reduce the corks to their required dimensions, when they are properly assorted, ready for the market. There are 21 blockers, 12 slicers and 7 tapering machines, 6 of them having a double working capacity, making the number actually equal to 13. The working force in the establishment at the present time is about 85 hands, producing 15,000 gross per week. The material used comes from Spain and Portugal. This manufactory was the first in the United States to cut corks by machinery, and is the first establishment of the kind in the country, there being only about six of any importance now in existence. In March, 1874, J. Cadwell, the enterprising and successful proprietor, died, since which time Mrs. Mary S. Cadwell, his widow, has assumed the entire management of the establishment, and evinces in her control of it rare executive ability and business qualities of an exceptionally high order. She is not only punctual in her daily visits to, and supervision of, her establishment, but manages the financial department with extraordinary success. She is all the more deserving of commendation from the fact that she had the firmness to continue business in the face of opposition from friends and the stringency of the times generally, thereby retaining in her employ a large number of deserving hands who otherwise would have been left in very unfortunate circumstances. The original machinery in the first factory was invented by Mr. Crocker, who was lost at sea while returning from France, where he had gone to endeavor to introduce his machinery. His widow came to Lancaster and enlisted Mr. Cadwell in the project which has proved so eminently successful. The present outfit of the establishment is an improvement on the old patterns, by Mr. Boardman.

JOEL S. EABY, Superintendent of the establishment, was born in Lancaster county, in 1838. He was educated in the common schools, but attended one session at the Normal School at Millersville. For seventeen years he was a teacher in one township of his native county, and for a few years was business clerk of the *Inquirer* Printing Company, of Lancaster. In both these capacities he gave much satisfaction by the intelligent and conscientious discharge of all his duties. In January, 1875, he was offered and at once accepted the position of Superintendent of the Conestoga Cork Works, and during the short time he has occupied it he has merited the full confidence of the proprietress. Although not a practical manufacturer, he is a thorough accountant and a careful and faithful manager, with an ever-watchful eye to the interests of the concern. He has introduced many reforms in the management of the works, and gives his undivided attention to his duties.

BEST STEAM ENGINE AND BOILER WORKS, Lancaster, John Best, Proprietor, manufacture Steam Engines, Boilers and Castings of all grades. The business was started in the rear of the Pennsylvania Railroad Depot, in 1853, in a frame building, 14 by 14 feet, which was formerly a stable, but was converted into a shop. John Best began alone as a blacksmith and repairer of boilers; as his business increased, he made additions in the way of shedding, and increased the working force to twenty hands within two years of time of starting. So rapid was the expansion that further additions for accommodation of trade could not be made, and a new location was sought. He purchased the Baptist Church property, on the south side of Chestnut street, nearly opposite the Pennsylvania Railroad Depot, and converted the church into a machine shop, abandoning the old property. This was in 1857. The dimensions of the new shop, a brick structure, were 54 by 54 feet. The great financial panic came on very soon after the occupancy of these premises, and for one year thereafter business was extremely dull, but it gradually expanded until 1865, when the trade had assumed such proportions that another new location was sought. During the first years of the war, however, the prospect was very discouraging and skilled labor hard to secure. As the war drew to a close, however, this particular business brightened wonderfully. The present site of works, to which John Best removed in 1865, is on Plum and Fulton, and along the line of the Pennsylvania Railroad. The lot covers an area of about one acre, and the buildings are as follows: Boiler shop, 100 by 60 feet, solid brick, slate roof; machine shop, 110 by 50 feet, also brick; foundry, 83 by 50 feet, and numerous out-buildings, sheds, etc., for various purposes. The working force at occupancy of these premises was about twenty men. The outfit in machinery was commensurate with the demand for production of boilers. The present capacity of the works is for a force of 200 men, but the stringent condition of business generally restricts the hands to about seventy men. The motive power for the establishment is supplied by one of Best's own improved boilers of 25 horse power, and a 20 horse power vertical engine of his own pattern. The equipment for the manufacture of boilers of the largest capacity is very complete in all details. Some of the heaviest boilers in use in the Conestogo Cotton Mills, of Lancaster, were built in these works. With a full working force, this establishment can turn out $20,000 worth of boilers per month. In the machine shop about twenty men are now employed, although its capacity is for fifty, and the production in machinery is about $10,000 per month. In the foundry there are twelve men engaged, which is not more than half its full complement; the production averages $8000 per month. In the aggregate these works have a capacity of 275 hands, and support is given by them in a direct and indirect way to nearly 1000 souls.

JOHN BEST was born in Lancaster county, seven miles from the city of Lancaster. His father was of Irish extraction, and emigrated to America when quite young; his mother was of Scotch extraction. His father served with distinction during the War of 1812, and was stationed at Fort Mifflin during a portion of the time. At the age of seven, John Best had the misfortune to lose his parents, and was thrown on his own resources; his education was acquired entirely by night study as he advanced toward the years of manhood. He engaged with a farmer at the age of eight, and continued until the age of eighteen, when he served an apprenticeship of three years at blacksmithing with John R. Russel, of the firm of Russel & Brother, of Lancaster. In the fall of 1843, after completing his term of apprenticeship, he went to Wilmington, Delaware, and served another apprenticeship of three years at boiler making with the firm of Betts, Harlan & Hollingsworth, now the firm of Harlan & Co., the steamship builders. Having finished his term of service he worked as journeyman with the firm, and assisted in the construction of some of the largest iron steamships in this country. In those days machinery had not taken the place of the hand, and all the more delicate details of shaping the curved sheets at the bow and stern were allotted to John Best. It was a very important duty, requiring a most steady hand and careful eye. From there he travelled extensively, North, West and South, working at his trade and increasing his knowledge of its details, until 1852, when he finally located in Lancaster and worked as a journeyman until 1853, when he started the small blacksmith and boiler repair shop in the rear of the Pennsylvania Railroad Depot. His business is now in a most encouraging and prosperous condition, and he has amassed quite a large competence. He is public-spirited and enterprising, and is identified with several business enterprises. He has speculated largely in real estate and Western lands; has been identified with the dry goods interests; is Vice-President of the Adams & Perry Watch Company, and a large stockholder in the same; is a director of the Bolt

Manufactory, a prominent industrial concern in Lancaster; is a director and stockholder of the Lancaster Zinc Mining Company, which promises to be one of the most valuable mines in the country; has been repeatedly offered political preferment, but has steadily and persistently refused; served, though unwillingly, for one term in City Council; is a prominent member of the Knights Templar organization of the Masonic fraternity, and was one of the charter members of No. 68 Lodge Knights of Pythias. His success in business is to be attributed entirely to a thorough knowledge of his trade, strict application and economy, his expenditures being always kept within his income. He is now attending to all the details of his steadily and largely increasing business. He was married, April 30th, 1844, to Miss Allbright, who died, July 22d, 1855. On September 17th, 1856, he married Miss Engles, of Lancaster.

CONESTOGO FURNACE, Lancaster, Pennsylvania, Thomas & Peacock, Proprietors (B. B. Thomas and A. H. Peacock), Manufacturing Pig-Iron. It was first organized as a charcoal furnace, in 1846, by a Mr. Ford, who operated it for some time in that capacity. In 1856, it was converted into an anthracite furnace, and operated by Geiger & Co. in the production of pig-iron. They owned it until 1865, when it was purchased by B. B. Thomas. The present firm organization was entered into in December, 1866. Previous to 1866, the works were not continuously operated, various causes interfering with a successful career. At the commencement of operations by the present organization, the producing capacity of the foundry was about seventy tons per week; its present production is 120 tons per week, and the steam power has been increased from a pressure of three pounds to square inch to six pounds to square inch. The heat in the blast, by improvement in hot ovens, has been increased from 400 degrees to 1200 degrees of heat. The working force now engaged in the furnace proper is about twenty men; but, to supply the material in ores, etc., necessary to the proper equipment of the establishment, nearly 200 men are employed. The company operate their own ore mines, which are located principally in the southern part of Lancaster county, from three to twelve miles from the city. They produce the brown hematite, which yields about 40 per cent. of iron. They use about 600 tons of coal, ore and limestone weekly in the manufacture of iron. The ore is brought from the mines by wagon. The works are located at the south end of Prince street, near the Conestoga creek, on a lot embracing about ten acres. The stack has an elevation of 38 feet, and 11 feet inner diameter. The casting house is 50 by 50 feet; the engine and boiler house, 55 by 60; and stock house, 70 by 50, all being stone structures save the last. The iron from this establishment finds a ready market in the neighborhood and eastern markets. The engine is a horizontal of about 155 horse power, with blowing tubs, and eight boilers with a capacity double that of the engine.

J. & J. K. GREENWALT, Tanners and Curriers, Harrisburg, Pennsylvania. The father of the members of this firm established himself in Harrisburg in 1811, first as a currier, and subsequently as a tanner, his means not permitting him at the outset to make full use of his knowledge in both branches. Within three years, through enterprise and industry, he was enabled to purchase a lot on Front street, 200 by 52 feet, from the heirs of the founder of Harrisburg, John Harris. On this lot he erected a small building and sank fourteen vats, accomplishing all the attendant work himself. There he remained until his decease, increasing the capacity of his tannery from fourteen to sixty vats and employing six hands. At his death, in 1854, his business was duly apportioned among his heirs. Prior to this date, in 1852, J. & J. K. Greenwalt, being unwilling to work longer as journeymen in the employ of their father, commenced business for themselves; they purchased the needed goods in Philadelphia, and were soon in possession of a profitable and thriving trade. Upon the decease of their father they purchased his place of business, its appraised value being $7000, and its site the ground now occupied by the residence of William Calder. They then employed from six to eight hands, and did a business amounting to about $10,000. The tannery being located in the most beautiful part of Harrisburg, and the ground becoming very valuable, they deemed it advisable to sell the ground and remove to a larger place. The corner formed by Eleventh and Paxon streets was selected as a new site, and this lot, consisting of three acres, upon which stood a three-storied brick house, was purchased from Hon. Simon Cameron and Dr. Robert Harris. There was erected their present tannery, 120 by 45 feet, and containing seventy-five vats, many of which are of

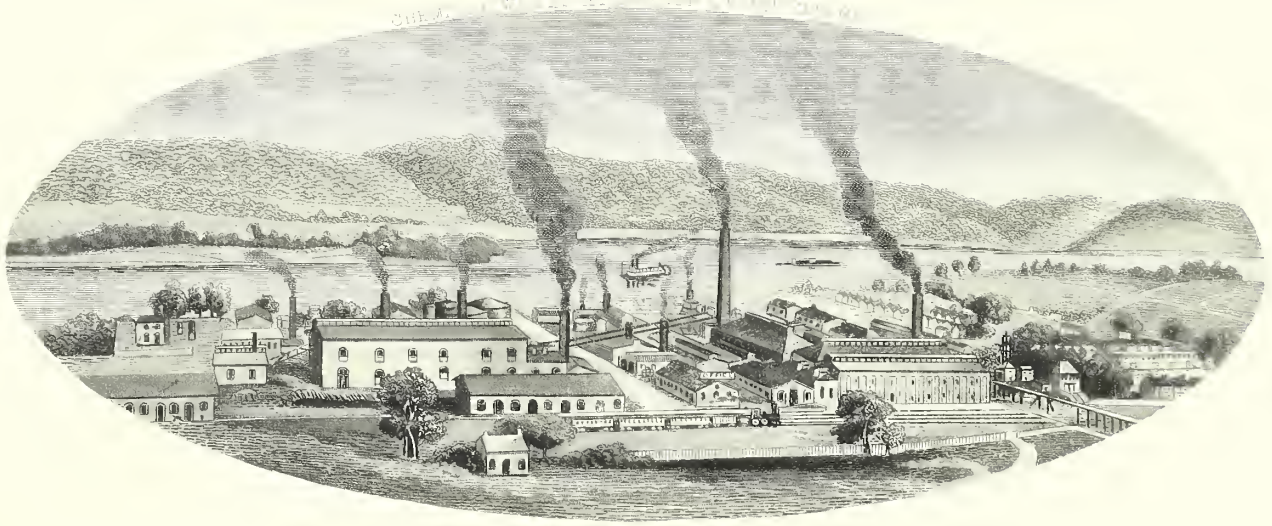
twice the ordinary capacity. Immediately after the yard was completed, large leakages manifested themselves, and it became necessary to remove the entire system of vatting, a measure involving a loss of upward of $3000. Several months elapsed before this unforeseen misfortune was redeemed by the profits of their business, but since that time they have uniformly met with great and merited prosperity. As their business increased, an addition of 40 feet was joined to the original establishment, also a building for a salesroom and a finishing department, on Market street, 40 by 45, and five stories in height. They have, moreover, recently purchased, with a view to occupancy for business purposes, the extensive works of the Harrisburg Stove Company, which are situate on five acres of ground and consist of two large buildings, one 80 by 100 and one 120 by 50 in dimensions, and three stories in height. Between twenty and thirty hands are steadily employed in their establishment, and their business capital is about $120,000. Their tannery is the largest in this section of the State, and their annual transactions amount to $70,000. The "Greenwalt leather" is highly valued wherever known, and the leading dealers of Philadelphia claim it as the unique standard. The firm owe their success to an undeviating and strict honesty in all business relations, to the uniform excellence of their product and their promptness in sustaining all contracts in a liberal and just spirit.

JACOB GREENWALT, the senior member of the firm, and son of Jacob Greenwalt, was born in Harrisburg, Pennsylvania, August 10th, 1826, and is of German descent. He was educated at the public schools of Harrisburg, and at the age of sixteen entered the bark mills, and subsequently continued in the employ of his father until he had thoroughly learned the tanning business. Eventually, with his brother, entering into business on his own responsibility, he has since met with the success won by talent and industry.

JEREMIAH K. GREENWALT also was born in Harrisburg, Pennsylvania, on the 30th of July, 1830. He received his education at the neighboring night schools, his days being passed in constant and arduous labor. In 1846, he was placed in his father's yard, and remained there until connected with his brother in the business which is now so successful, and in which he has charge of the finishing department and the salesroom. He was married, in 1858, to Annie L. Wolfersberger, of Harrisburg.

THE PENNSYLVANIA SALT MANUFACTURING COMPANY was chartered in 1850, with a capital of $1,680,000; its principal object being the manufacture of various chemicals largely in demand, and which previous to that date had been chiefly imported from abroad. The company erected its works primarily at Natrona, a town in Allegheny county, in western Pennsylvania, about twenty-four miles distance from Pittsburgh, and latterly has located its branch works in Philadelphia. At the former named locality it owns over 250 acres of land, on which its large establishment is erected, which consists of immense laboratories, machine shop, boiler shop, saw mills, stave and barrel machinery, and brick yards for the manufacture of fire brick, beside the commoner varieties: all these are consumed by the company in the course of its operations. It has likewise erected a large number of dwelling and tenement houses for the work people, affording accommodation to nearly 3000 persons. The principal product of these works is soda, which is manufactured from kryolite and also from the salt obtained from their own wells. They also manufacture caustic soda, sal-soda, bi-carbonate of soda and the pure forms of soda for glassmakers' use. The company is the only heavy producer of soda in the United States, having been eminently successful in competing with the English manufacturers. It makes, in addition to the above, various mineral acids, especially sulphuric and nitric acids; also copperas, alumina and a number of chemicals of minor importance. The company owns some 550 acres of coal lands, which afford a supply to its numerous works and smith shops. The branch works, at Philadelphia, are situated on the right bank of the Delaware river, about fifteen minutes drive from the centre of the city, and cover about seventy-five acres of land, with a river frontage of 500 feet. By the improvements which have here been made in the construction of docks and piers, a wharf line of some 3000 feet has been effected; and by the numerous sidings and tracks of the Pennsylvania Railroad running to and from these works, most admirable facilities for the reception and transportation of goods are afforded, thus enabling the company to move its wares in any direction attainable by railway or by the ocean lines. The buildings are very extensive, several of them covering nearly one and a half acres, under one roof. The principal article here manufactured is alum, in the usual crystalline forms; the celebrated porous alum, and other descriptions of the salts of alumina, are also

Manufactory, Mill, &c.



Pennsylvania Salt Manufacturing Co.

produced. The extent of the establishment may be judged from the fact that it supplies from one-half to two-thirds of the total consumption of the United States. This result is largely due to the extreme purity of the ingredients used: the alumina being obtained in a state of almost chemical purity from kryolite, which is entirely free from iron. This mineral is imported by the company—which has the exclusive right of importation in this country—in vessels chartered for the purpose, from Irigtut, Awuks Fiord, Greenland, the right having been secured from the Danish Government, under which it imports two-thirds of the product of the mines, the remainder being principally used in Denmark and northern Germany. In addition to alum, it also manufactures sulphuric acid and bi-carbonate of soda. The combined product of the latter article by the two works far exceeds that of any in the world. Its preparation of soda, especially that bearing the Natrona brand, being of almost absolute purity, in this respect is unapproached by the best productions of the British manufactories. A very important feature is the manufacture of concentrated lye, on which the company owns several patents. It produces many million pounds annually, and it is principally used in the domestic manufacture of soap from refuse grease, which would otherwise be wasted. It is estimated that 80,000,000 pounds of soap are thus annually produced, effecting an economy in this one article throughout the country amounting to several million dollars annually. The recent President of the company was the late Thomas Sparks, to whose energies, assisted by the combined talent of the superintendent and other active members of the corporation, is attributable the great success which has crowned the efforts of this large enterprise, at once a credit to its promoters and officers and the State. The present directors of the company are Samuel P. Fisher, James C. Fisher, Thomas S. Ellis, Francis P. Steel, George Harding, Joshua Lippincott and Albert F. Damon. F. B. Steel is President *pro tem.;* Henry Pemberton, Vice-President and General Superintendent; Samuel Simes, Secretary and Treasurer; Clifford Pemberton, General Agent.

THOMAS SPARKS, late President, was born in the old district of Southwark, Philadelphia county, Pennsylvania, April 19th, 1817, and was educated at Nazareth Hall, the celebrated Moravian Boarding School. In 1838, his uncle, Thomas, took him into his business of manufacturing shot, the latter having for thirty years previous been engaged in this vocation, and being then sole proprietor of Sparks' Shot Tower, a prominent landmark near the Delaware in the southern part of the city. He continued with his relative until his death, and in 1855 succeeded to the business. The establishment has been in active operation for nearly two-thirds of a century, and has manufactured vast quantities of war material, especially during the War of the Rebellion, when large orders for conical bullets were received and filled. Mr. Sparks died October 8th, 1874.

SCHUYLKILL IRON WORKS, Philadelphia, Alan Wood & Co., Proprietors. The origin of this firm may be traced as far back as 1802, when James Wood, father of Alan Wood, the elder, with Joseph Potts, commenced the manufacture of iron at the Pennypack Iron Works, in Philadelphia county. This same Joseph Potts had been similarly engaged with Colonel William Dewees many years previous, and they were the owners and proprietors of the Mount Joy Works—as they were then termed—on Valley creek, Chester county. During the Revolutionary War the British burned the works, and the site was subsequently occupied by the American army, which wintered there, while the British occupied Philadelphia. The name of Valley Forge was then given to it, and the spot will ever be associated with the name of Washington and his noble band of patriots and martyrs. In 1816, James Wood was proprietor of Valley Forge and manager of the iron works, where the manufacture of sheet and plate iron was carried on; also saws, shovels, spades, etc. It was at these works that the first cast steel was manufactured in the country, except a small quantity produced by the same operators in New York. He continued here until 1821. In 1826, Alan Wood, the elder, with his father, James, leased the Delaware Iron Works, which had been erected in 1812, near Wilmington, Delaware, where they pursued the same line of business as had been previously carried on at Valley Forge; and here they continued prosperously until 1832. Alan Wood had early become satisfied that the best machinery could only be profitably handled by able and intelligent workmen. Seeking men of talent, he educated them for their particular work. This course has proved of immense advantage; and, in this connection, it may be remarked, that there are operatives at the present time (1874) in the employ of the firm who date back their engagement to the year 1827, a continuous service of nearly half a century. In 1832, the same parties,

then known as the firm of James Wood & Son, built the Conshohocken Iron Works, at the town since called by that name, which they ran by water-power and successfully operated until 1844, producing then about 500 tons of sheet iron and steel annually. When they commenced operations at this point, there was not a house in the town save an old log cabin, inhabited by "Ned Hestor," an aged colored man, and after whom Hestor street in that borough was named. This town now contains about 4000 inhabitants. In 1844, the firm of James Wood & Son was dissolved, and Alan Wood, Sr., with his eldest son as manager, continued the manufacture of sheet and plate iron at the iron works in Delaware. Here also they improved upon and still maintained the production of their Patent American Russia Sheet Iron, which article at the present time—by various important processes, secured by letters patent—the existing firm continues to manufacture, and which is fully equal to the imported article, while it can be sold for 50 per cent. less. In 1857, Alan Wood, with Lewis A. Lukens and the sons of the former, under the firm of Alan Wood & Co., erected a steam rolling mill at Conshohocken, Pennsylvania, called the Schuylkill Iron Works, which from time to time has been enlarged and improved by the addition of other mills and the necessary machinery, so that they produced, in 1861, from 3000 to 4000 tons yearly; in 1866, the production was increased to 8000 tons annually; and the further additions, which were completed in 1873, have enabled the firm to turn out 15,000 tons each year. The new mill, completed in seven months working time, is 360 feet long and 100 feet broad, with a wing 60 by 50 feet. The roof extends over the iron yard, and the whole edifice is absolutely fire proof. The most approved machinery was placed therein, and just when ready to commence work the financial panic of 1873 occurred; but the old ship weathered the storm. In 1869, Alan Wood, the elder, retired from the business, but the firm name is still retained, and the partners at present consist of his sons, Thomas Alan, Jr., and Howard Wood, with Lewis A. Lukens and his two sons, J. A. Wood and Charles Lukens. Starting originally with little or no pecuniary means, but gifted with singular intelligence, industry, energy and ingenuity, and practising economy and temperance, they have built up the business to its present vast proportions, having a capital of $1,000,000 actually invested. From the amount of 300 tons, produced during the first year, they have now, as above stated, the yield of 300 tons per week. The works cover ten acres, and give employment to 500 hands. The value of the iron annually produced is at present estimated at nearly $2,000,000. They attribute their success to the fact that all the members of the firm are practical workingmen. They have the highest reputation in the United States for the manufacturing of all the various kinds of sheet and plate iron, from the commonest description of block iron to the finest grade of patent planished sheet iron. They also excel in the production of galvanized sheet iron; and the Patent American Russia Sheet Iron, as already noticed, can scarcely be distinguished from the imported or true Russian make. The Philadelphia warehouse and offices are located at 519 Arch street. A telegraphic wire, twelve miles long, extends from this point to the mills at Conshohocken, thus affording instant communication between the manager and his partners.

ALAN WOOD, Sr., and founder of the firm, was born in Plymouth township, Montgomery county, Pennsylvania, December 25th, 1800. He was one of a family of twenty children, and a son of James and Tacy (Thomas) Wood. His paternal great grand-parents emigrated from Dublin, Ireland, in the early part of the eighteenth century, and settled near Philadelphia, and brought with them the certificate of being members of the "Yearly Meeting of Friends" in that city. He was carefully trained up by his parents, and, after receiving his education at Philadelphia and Valley Forge, was assigned to the duty of Storekeeper and Assistant Manager in his father's works, at the latter point, when but sixteen years of age, and continued to hold the same until 1821.

THOMAS WOOD, senior partner of the firm of Alan Wood & Co., is the second son of Alan Wood, Sr., and was born in December, 1827, in Delaware. He received his education in Philadelphia, and graduated from the University of Pennsylvania, in the class of 1846. He subsequently entered the office of Hon. Henry J. Williams, as a student at law, and was admitted to practice at the bar in 1850. He is a most accurate scholar and able financier. On him devolve the purchases and sales of the firm, and the conducting of all financial transactions arising in the course of their extensive business.

ALAN WOOD, Jr., was born in Philadelphia, July 6th, 1834, and was educated in the Central Institute, in that city, under the preceptorship of Dr. A. L. Kennedy, the present Chief Professor of the Polytechnic College of Pennsylvania. When seventeen years old, he went to the Delaware Iron

SCHUYLKILL IRON WORKS
ALAN WOOD & CO.
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ROLLING MILL
PUDDLING FURNACES
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Works, and took charge of the same in 1854, though he had not attained his majority. He removed to Conshohocken, Pennsylvania, in 1857, where he assumed the management of the Schuylkill Iron Works, then just completed. At that time from 1000 to 2000 tons were produced per annum. He has since remained as Manager and Superintendent of these works, and during all this period has designed and superintended the erection of all the additions and improvements; to the machinery he has given special attention, and has invented and patented several processes, etc. Among these may be noticed an improved or an entirely new mode for closing or opening three high rolls; so that by one motion of the screw-pin both top and bottom rolls are simultaneously opened and shut. This invention has been highly approved of by eminent and practical machinists. He has designed, and caused to be erected and completed, offices, shops, gas works, pumping machinery and large engines, trains of rolls and furnaces, for the successful operations of the works. He has likewise organized a large force, 500 men, some old operatives, but the greater part new hands, good, steady workmen, managers, machinists, puddlers, heaters, rollers, etc., and has so systematized and divided the labor that each man has his own sphere of duty to perform. In 1872, in connection with other citizens, he was instrumental in having the water works erected to supply the borough of Conshohocken with water, and is one of the managers of the same. In 1873, he succeeded in establishing the First National Bank of Conshohocken, with a capital of $150,000, and is the President of the same.

HOWARD WOOD was born in Philadelphia, in 1836, where he was also educated, graduating with full honors at the University of Pennsylvania. He has paid especial attention to chemistry, a science so important in connection with his calling.

UNION PLANING MILL, New Castle, G. W. Crawford & Son, Proprietors. This establishment was commenced in 1865, by Gorley & Crawford, which firm continued until the close of 1870, when the senior partner retired and the remaining member of the firm associated with him his son, and these latter have since continued the business. The original mill was of frame, two stories in height, was of the dimensions of 45 feet wide and 70 feet long; in it some fifteen men were employed. It was destroyed by fire in June, 1873, and was rebuilt by the present firm. The new mill is more than double the size of the former structure, measuring 73 feet by 100 feet, and is constructed of brick. It is situated at the corner of Beaver and Bridge streets, and contains a complete set of machinery pertaining to a first-class mill. This consists of a planer, a flooring mill, two moulders, three rip-saws, one re-slitting saw, one cut-off saw, one shaper, one blind-slat tenanter, one tenanting machine, one mortiser, one jig-saw and one sand-papering machine. These are all driven by a steam engine of seventy-five horse power, built by Shaw, Waddington & Co., of New Castle. Twenty-five men are employed by the firm, and about 1,000,000 feet of lumber is annually consumed; and from this are many different articles for house-building produced, such as doors, window-sashes, blinds, floorings, sidings, mouldings, etc.

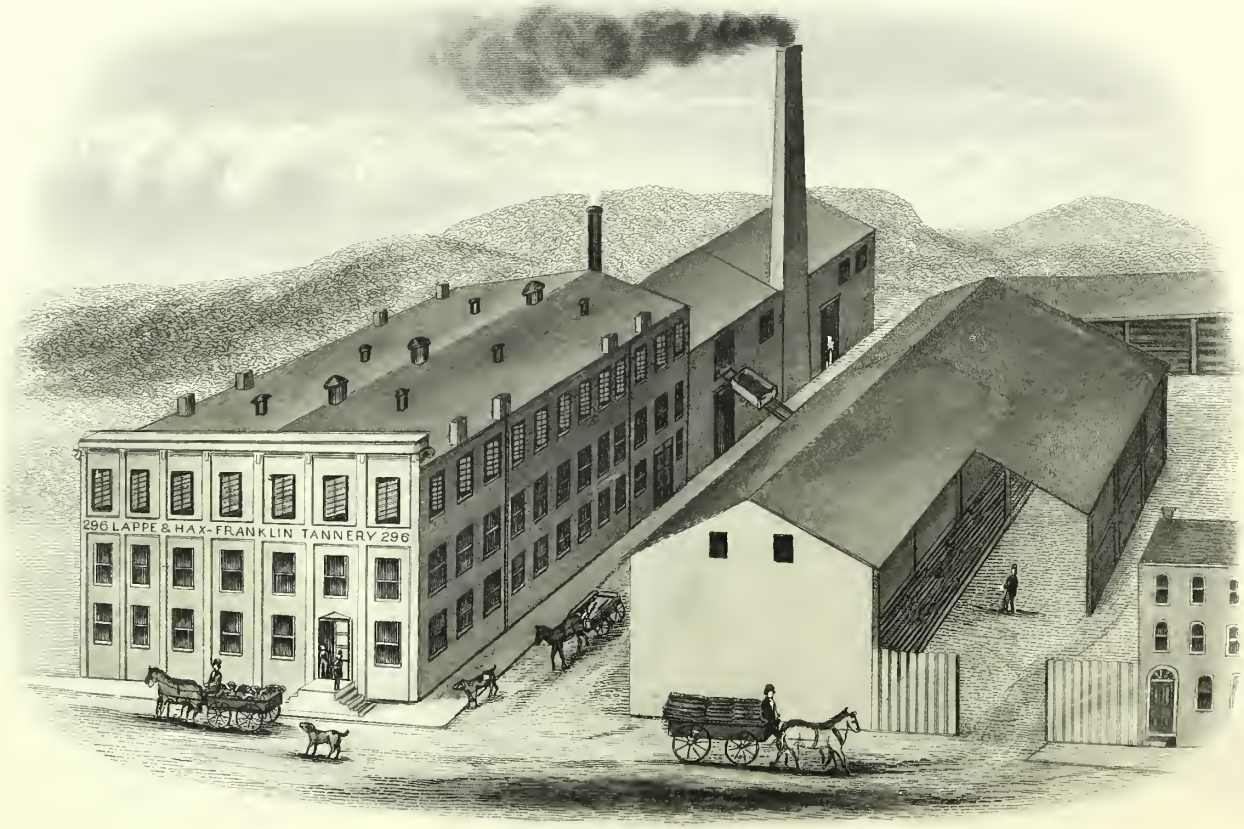
DARK RUN MILLS, Briggs Brothers, Proprietors, Frankford, Philadelphia. These mills have been in operation for sixty years, having been first used by Stephen Sicard to manufacture umbrella and parasol handles. In 1828, William Richardson changed them to a cotton spinning works, and up to 1837 they were operated by water power alone. At the latter date steam was added by James Haworth, and cotton weaving was also done. From 1850 to 1853, Haworth & Rishton operated the same, with sundry changes among the partners, until they sold out, in 1869, to John Briggs, father of the present proprietors. At the time he took possession the mill contained twenty-four looms, two first-class breakers of 48 inches, carding machines, and three 30 inch finishers. There were also three mules of 252 spindles each; one doubling and twisting machine of sixty spindles; and one doubling and twisting mule of 316 spindles. He continued until 1866, when the firm of Morgan, Briggs & Co. was formed, and in the following year John A. and Charles Briggs, under the style of Briggs Brothers, purchased from their father the mill property, and have since successfully operated the same. They have, at various times, increased the capacity and machinery of the works, which at the present time contain forty looms; three full sets of woollen cards, with breakers of 48 inches, and finishers of 60 inches; 522 self-acting mule spindles; one hand mule of 252 spindles; three doubling and twisting frames of 100 spindles each, together with a full equipment of auxiliary

machines. The premises are located in Frankford, now the Twenty-third Ward of the consolidated city of Philadelphia, and the mill buildings cover one acre of ground. They also control the dam of one acre, and the mill-race to convey the water from the pool to the mill occupies one acre. Employment is given to about fifty-five hands, and the goods manufactured are cottonades, double and twist, known as the "Bell Cassimeres," which have been made at these mills by the several proprietors successively since 1837. The goods find a market in Philadelphia, New York, Baltimore, Boston and Chicago, and the proprietors enjoy an enviable reputation for the superior character of their production. They attribute their success in this respect to their own energy and industry and their determination to excel. They propose to double the capacity of the works during 1875, and will continue to use both water and steam as at present.

JOHN BRIGGS, the father of the present proprietors, was born in England, in 1798, and emigrated to the United States in 1817. When twenty-one years of age, he entered into business as a wheelwright, having learned the trade in England. He subsequently engaged in the dyeing and finishing of all kinds of cotton and woollen goods, connecting with that the manufacture of umbrella and parasol sticks and handles of all descriptions. In 1842, he started printing calicoes with two machines. He was then located in the borough of Frankford, and was so successful that he erected a factory of twelve machines, known as the "Tacawana Mills." He continued operating the same until 1856, and, in 1857, purchased the present property, which he ran till the close of 1866, when he retired from business in favor of his sons.

HECLA FOUNDRY, Pittsburgh, John Roney, Proprietor. In October, 1861, the present proprietor started this establishment in a small way, with but a limited amount of capital, and employing but three hands, a moulder, a laborer, and a boy, giving his own personal attention to all the details of the business, and performing the greater part of the moulding himself. His industry and good workmanship met with its reward, and, in the course of time, as he became more generally known, orders flowed in and his productions increased. Since 1871, he has constantly employed thirty-five or forty hands, and turns out nearly 1500 tons of castings per annum. The principal articles manufactured are chilled hammer dies, ingot moulds, ordinary rolling-mill work, furnace castings, and XX stoves. The works are situated on Twentieth street, extending from Smallman street to an alley, 238¾ feet, with a depth of 120 feet. The principal building is of the dimension of 60 by 120 feet; a second is 50 feet square; and the machine-shop measures 20 feet front and 50 feet deep. The proprietor attributes his success to his personal attention to business and the superiority of the work turned out. He has done the greater part of the moulding for the great steel works of Hussey, Wells & Company.

THE FRANKLIN TANNERY, Allegheny City, Lappe & Hax, Proprietors, was founded in 1841, by George Lappe, the father of the senior member of the present firm. He commenced the business of sheepskin tanning in a very humble way in a small place situated near the old Hope Cotton Mill. A thorough knowledge of his business and strict attention thereto gained him an ever-increasing trade, and, in 1843, he moved to the present site of the works, on Spring Garden Run, and enlarged his facilities. In the following year, he admitted his son, Martin Lappe, into partnership. Under the new firm the business prospered even more rapidly than before, and, in 1845, they began the tanning of beef hides. In 1856, Adam Wiese, a son-in-law of the senior, was admitted into partnership, but the title of the firm remained unchanged. Two years later they entirely discontinued the tanning of sheepskins. In 1859, George Lappe, the founder, died, leaving a prosperous business—the result of his economy, industry, and perseverance—in the hands of his son and son-in-law. Lappe & Wiese, some three years later, began to make extensive improvements, and erected a three-story brick building, 70 by 160 feet, with boiler-house attached, on their premises. It was then named The Franklin Tannery. After successfully carrying on the business for thirteen years, the firm of Lappe & Wiese was dissolved, in 1872, by Adam Wiese's withdrawal. Christian C. Hax, a young man long in the employ and confidence of the firm, was received as partner, and augmented prosperity followed the change. The capital employed in the business of Lappe & Hax is about $140,000, and the number of hands constantly employed averages about forty. Over 32,000 sides of leather are tanned each year, and the annual produce of the establishment is valued at



FRANKLIN TANNERY.

Lappe & Hax. Spring Garden Ave. Allegheny City, Pa.

fully $220,000. Their sheds are most extensive, having a capacity for about 1500 tons of bark. This tannery is the largest in Allegheny county, and is second in repute to none in the United States. They now devote their attention exclusively to the production of harness leather, and have gained a wide reputation for the excellence of the article which they furnish. Their success they attribute not only to their mode of manufacture but to the fact that first-class raw material only is used. The demand for their leather is so great that they can afford to be very choice in the selection of customers, and not one dollar of bad debts has been upon their books since the war.

GEORGE LAPPE, the founder of this industry, was born in Hesse Darmstadt, Germany. He emigrated with his family to the United States in 1840, locating in Allegheny City. Times were dull and employment scarce, and, in order to meet the necessities of a large family, he determined to risk the small surplus remaining to him in business. Although he had hardly lived long enough in the country to master the rudiments of the language or learn the habits of the people, he, trusting to his industry and knowledge of his business, commenced the tanning of sheepskins in a very small way. From this small beginning the business steadily increased until it has reached its present considerable proportions. He died in 1859, having made wealth by his industry and a spotless record by his honesty.

MARTIN LAPPE, senior partner, was born in Hesse Darmstadt, Germany, in 1819. At the age of twenty-one, he came to this country with his father, for whom he worked for three years, at the end of which time he became a partner in the business. He is thoroughly acquainted with his trade in its every detail, and, though largely interested in outside investments, the tannery has always his first thoughts and attention. Directorships or managerial honors in banks or other institutions in which he holds stock he invariably refuses. While taking a lively and patriotic interest in political questions, he has never sought prominence as a politician or public officer. In religious faith he is a Presbyterian, and belongs to the German church of that denomination in Allegheny City.

CHRISTIAN C. HAX was born in the city of Baltimore, Maryland, in 1844, of German parentage. In 1862, he removed to Allegheny City and entered, as an apprentice, the employ of Lappe & Wiese. After ten years service with that firm, as apprentice, journeyman, and clerk, he succeeded Adam Wiese as junior partner. His business education, which is thorough, he acquired during the early years of his service. By the intelligent cultivation of his natural abilities, by honesty, and by close application to the duties of every station which through life he has occupied, he has gained the enviable position which he now holds. He attends to all the outside business of the firm, and relieves the senior partner, who is also his brother-in-law, of much of the management of the internal workings of the establishment. He is now serving a second term as a member of the Councils of Allegheny City. He is a member of the German Presbyterian Church.

SPRING MILLS, Frankford, Philadelphia, Borie & Mackie, Manufacturers of Plain and Carved Umbrella Sticks. The business was originated in the borough of Frankford, about the year 1817, by a person named Tasker, in a building which is now a portion of the Frankford Dye Works. Cheric Borie, father of the present senior partner, was foreman of the establishment; and, when Tasker relinquished the business, he was succeeded in the same by his foreman, who commenced operations at Rowlandville. He afterwards associated John Briggs with him in the business, and the firm was known as Borie & Briggs. They erected, in 1827, a mill at the corner of Paul and Tacony streets, and removed to that locality when it was completed. After some time had elapsed, they admitted James Knight as a partner, the style of the firm being changed to James Knight & Co. In this connection, it may be stated that Jonathan Knight, the father of the new partner, had previously started an establishment in Hedge street; and, at his death, was succeeded by Walter Knight, who, having associated himself with Joseph Van Kirk, as Knight & Van Kirk, introduced the manufacture of all descriptions of umbrella furniture. The firm of James Knight & Co. prospered exceedingly, and they had become the largest manufacturers of umbrella sticks in the United States. On the death of James Knight, the firm resumed their former appellation—Borie & Briggs. In 1834, Borie retired from the concern, and was succeeded by Harvey Quicksall. Borie, however, commenced operations again on his own account at Dark Run, and carried them on for a number of years, during which time several firms in succession occupied the Frankford Mill; included among

these were Jones & Quicksall, and John Wilcock & Co. All these from time to time retired from the business. In 1853, Edward Borie & Co. established a mill on Point Lane and continued operations for about a year, when the firm was dissolved, and he then received Alexander Mackie as partner, the style of the firm becoming Borie & Mackie, which has been unchanged for a period of over twenty years. From Point Lane they removed their quarters to a part of the Willow Brook Mill, but no sooner had they fairly commenced work than the building was destroyed by fire. They then erected a mill of their own in John street, where they remained until 1866, when they purchased the establishment of Jeremiah Quicksall, who was then retiring from business. They have more than doubled the capacity of the works, and, in 1874, added a new building. It is one of the two largest establishments in the United States. The buildings are all three stories in height and are of the following dimensions: one is 78 feet long by 18 feet wide; a second is 64 by 30 feet; a third, 55 by 25 feet; and a fourth, 28 by 30 feet. There are also on the premises two small one-story buildings, a storeroom 30 by 40 feet, the necessary shedding, and extensive stables. The works cover a lot 100 feet on Wall street, 124 feet on Orchard street, with an intervening depth of nearly 300 feet. The several mills and workshops are filled with the most approved labor-saving machinery, driven by a steam engine of some 25 or 30 horse power. Five hundred thousand feet of maple plank are here annually consumed; shellac, drugs, and alcohol, amounting in value to $1000 per month, are also used. The firm give employment to between 130 and 140 hands, and the monthly pay-roll ranges from $3500 to $4000. From 7000 to 8000 gross of umbrella sticks are produced annually. When it is stated that Tasker half a century since employed but three men and eight boys with the rude machinery then used, it is apparent that the business has grown to enormous proportions since its inception. The goods as manufactured are sent to all parts of the United States, and the firm are noted for their superior work and the excellent quality of their sticks. With the sticks and handles, fashion has played a winning game of contraries. Thick and thin, long and short, heavy and light, these supports have been in turn, and will so continue to be probably till the end of time.

EDWARD BORIE was born in Frankford, Pennsylvania, June 13th, 1818, and is a son of Cheric Borie, a native of France, who had some years previously emigrated to the United States. He was educated at the old Frankford Academy on Paul street, and also at the Friends' School. When fifteen years old, he took charge of the varnish department in the factory, and also attended to the city trade until his father relinquished business. He then effected an engagement as bookkeeper with Elliott & Abbott, afterwards Abbott & Co., where he remained until he became proprietor of the mill in Point Lane. He is a valuable citizen, and takes a prominent part in all enterprises to promote the welfare and prosperity of the community where he resides. In political faith he is an earnest Republican, but, beyond being a Representative in the Congressional Convention for many years, he has never been the recipient of public favor.

ALEXANDER MACKIE was born at Paisley, Scotland, in 1819. His father, who was an accountant, emigrated to the United States when Alexander was very young and settled in Philadelphia, and afterwards removed to Manayunk. Alexander was educated in private schools in Philadelphia, and served an apprenticeship with M. Heston & Co., where he learned the trade of a millwright. After attaining his majority, he continued to work as a journeyman in their employ for some time after. He subsequently became Millwright, Machinist, and General Superintendent of Machinery at McBride's Weaving and Printing Mills. In 1854, he entered into partnership with Edward Borie, having been previously employed in the stick factory of John Wilcock & Co., Philadelphia county.

THE WESTERMAN IRON COMPANY is located at Sharon, Mercer county, Pennsylvania, and the works are the largest in the county. They were originally established, in 1848, by a joint stock company of operators from Pittsburgh, of which General Joel B. Curtiss was President; and they were run until 1852, when they passed into the hands of the Jackson Steel Company, and were changed to steel works. In 1854, the latter concern failed and the works were virtually abandoned until 1861, when the property was purchased by William Coleman, James Westerman, C. B. Wick, Jr., and P. W. Keller. In 1865, Coleman and Wick disposed of their interest, and C. H. Buhl, C. H. Andrews, W. J. Hitchcock and James Westerman became the owners. This firm remained unchanged until March, 1874, when the last named gentleman

James Westerman.

retired, the other members purchasing his interest. The present owners consist of C. H. Buhl, C. H. Andrews, W. J. Hitchcock, and P. W. Keller, who have adopted the style of the "Westerman Iron Company." The works are now in a flourishing condition, having continued operations notwithstanding the financial panic of 1873–4. The premises consist of forty acres of land, situated on the east bank of the Shenango river, within the corporate limits of the borough of Sharon, and contiguous to the Pittsburgh & Erie Railroad, and the Atlantic & Great Western Railway. The works consist of two blast furnaces, capable of making 20,000 tons of iron yearly. The mill is 435 feet in length and 160 feet wide. It has 29 puddling and 11 heating furnaces; one muck train; one 16-inch car train; one 18-inch nail train; one 18-inch sheet train; two 8-inch guide mills; and 42 nail machines, turning out 85,000 kegs annually, which can be increased, if necessary, to 100,000 kegs. These are operated by several separate engines, aggregating 500 horse-power. Steam is furnished by 16 upright boilers of the Westerman patent, heated from furnaces at a saving of over $15,000 per annum as compared with those of the ordinary description. There are also machine, blacksmith and carpenter shops on the premises, and 111 tenement houses for the employés. The manufactures consist of sheet, bar, and hoop iron; nails, boat and railroad spikes, small T rails and lightning rods, the entire product aggregating 18,000 tons per annum. The company also owns and operates extensive coal mines situated in Trumbull county, Ohio; and, in 1863, constructed over two miles of railroad track, to connect with the Cleveland & Mahoning Railroad at the State line. Over this branch road and the main line the coal is shipped to the works at Sharon. About 550 tons are mined daily, 250 tons of which are consumed in the works, the balance going into the market. As previously remarked, these works are the largest and most complete in the county, coal, limestone and iron ores being delivered to all parts of the works by rail; in addition to which there are tramways traversing the entire establishment, on which cars are drawn by mule-power. In the mines and the iron works from 800 to 1000 hands are constantly employed.

JAMES WESTERMAN, the founder and chief promoter of the above-named works, was born in the city of Paris, France, November 26th, 1819, of English parents, but of Alsatian descent. His father was an extensive cotton manufacturer in Paris, but owing to the French Revolution of 1830, he failed in business, and then emigrated to the United States. Having located at Pittsburgh, he again engaged in cotton manufacturing in the firm of Beal & Westerman. He retired from business in 1837, and died in 1869. His son James received his early education in Paris, completing it in Pittsburgh. He entered the "Kensington Iron Works" as an operative in 1838; and four years later went to New Castle, Pennsylvania, where he assisted in building the "Onondaga Iron Works," then owned by Crawford & Reitter; and, in 1846, superintended the construction of "Reis, Brown & Bergess," Iron Works in the same town. In 1855, in connection with Joseph H. Brown, William Bonnelle and others, he purchased the "Mahoning Iron Works," in Youngstown, Ohio, and from a very small business built up one of the largest iron works in the country. Disposing of this, in 1861, he, in company with others, bought the works which now bear his name. At that time they were sadly out of repair, located fourteen miles from the nearest railroad, and labored under many disadvantages and difficulties, all of which were happily overcome, and the works took a place among the largest and most successful in the Commonwealth. He retired from the concern in March, 1874. In 1872, he was elected President of the First National Bank of Sharon, but has since resigned. In the same year he sailed for Europe, visited his native city, and his kinsmen, the renowned Westerman Brothers of Genoa, Italy, who constructed the machinery for excavating the Mount Cenis tunnel. In 1871, he was chosen Chairman of the "National Association of Bar-Iron Makers," which office he still holds. He is the patentee of several valuable inventions; among which are a boat-spike machine, a puddling furnace, a smoke-consuming apparatus, a bar bank and straightener, a coal-cutting machine, and a combination of puddling furnace, water neck and upright boiler. Personally he is of a commanding appearance, and is possessed of great business qualifications, liberal ideas and fine literary culture. He has ever been a leading spirit in all worthy public enterprises, and it is not superfluous to add, that to him, more than to any one else, is due the past and present prosperity of the town of Sharon, and the Shenango and Mahoning valleys.

EMANUEL PETERS, Quarryman and Railway-builder, was born in the borough of York, York county, Pennsylvania, September 18th, 1818. He received his education in a common school in his native place, where he won for himself the distinction of being a most apt pupil, attentive and studious. At the age of twenty-two he went to

Philadelphia, and two years subsequently became engaged in the quarrying business. By an indomitable spirit of perseverance and energy he won for himself a reputation for scrupulous honesty and excellent business tact, as well as the implicit confidence of his numerous friends and acquaintances. In 1859, he assumed the responsibility of constructing the "North Philadelphia Railroad" (subsequently called "The Central Passenger Railway"), for which he was to receive as compensation the sum of $108,000. After completing the road, and not receiving the amount of his contract, he purchased some $50,000 worth of the stock and bonds, and eventually concluded to cancel the indebtedness due him by the company, by receiving their stock and bonds at par; thus becoming the owner of over $150,000. But misfortune attended the enterprise, and the Legislature of Pennsylvania repealing the charter in 1865, it ceased to exist as a corporation. He thus lost the fruits of many years' labor at one swoop; and was obliged to return to his old business of quarrying, which he has ever since continued, and in which he has been most successful.

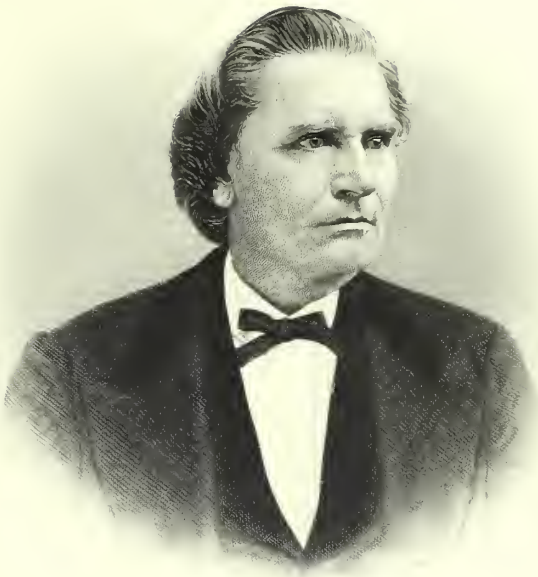
THE WESTERN FILE WORKS, David Blake and James M. Fessenden (Blake, Fessenden & Co.), Proprietors, are located at Beaver Falls, on the Fort Wayne Railroad. Originally started in 1865, they were finally completed and established upon a firm basis in 1869. The ground now covered by the shops, etc., directly employed in the manufacture of files by this firm is in extent over five acres. The buildings, extensive at first, have been enlarged several times in order to afford manufacturing facilities adequate to the ever increasing demand met by the firm. The main factory now presents a continuous front of 500 feet, two stories in height, with a wing 300 feet in length, and one story high; together with two other wings of 60 feet in length each, and one story high; all substantially constructed of brick. Besides these, there are some half dozen buildings of lesser dimensions. Starting with a trade that did not aggregate $150,000 for the first year, the business has gradually increased until the present annual product is valued at over half a million of dollars. The number of workmen employed exceeds 250, and their labor is greatly facilitated by the numerous patent machines employed, one of which, a machine for grinding, patented by David Blake, will do as much work in the same time as could be accomplished by ten men in the ordinary way. With all the force of hands and art appliances the demand is barely kept pace with. All the kinds of files and rasps known to the trades are manufactured here, and the consumption of them is almost incredible. Every file bearing the stamp of this firm is warranted to be made of superior cast steel and to be fully equal in every respect to the best of English manufacture. But a few years back the country was almost entirely dependent upon England for its supply of files, but the success of such enterprises as this has entirely obviated the necessity for the importation of these useful and indispensable articles. The demand for the American goods comes from all parts of the United States, but it is particularly heavy from the western and southern sections; in the last few years the trade with California has grown extremely large and is still increasing. The location of the works is particularly advantageous, Beaver Falls being situated in convenient proximity to the great sources whence comes the supply of materials, and the facilities for the shipment of goods to any portion of the Union or to foreign markets are all that could be desired. The greater portion of the shipments are made from the factory direct, but for the accommodation of purchasers in New York and the Eastern States the firm has established an office in New York city.

JAMES M. FESSENDEN was born at West Cambridge, Massachusetts, in 1816. His parents afforded him unusual educational advantages, which he steadily pursued until 1833. About this date he apprenticed himself to the trade of file and saw making. After the expiration of his term of service he was manager of a hardware manufacturing company, at Woburn and Boston, for some time, and subsequently bought out a saw manufacturing establishment at Woburn. He then embarked in the file making trade at West Cambridge, Massachusetts, and in this continued about twelve years. In 1859, he assumed charge of the Whipple File and Saw Manufacturing Co., in Rochester, New Hampshire. Here he remained for ten years, during a portion of which time he was Chairman of the Board of Select Council and Town Treasurer. Here also he succeeded in successfully manufacturing files by machinery. He then located at Beaver Falls and established the present works, the largest and most complete in the world. He is the oldest manufacturer of files in the country, and a man of great capacity, character, and influence. He is at present Chairman of the Committees on Finance and on Roads in the Council of the borough of Beaver Falls.

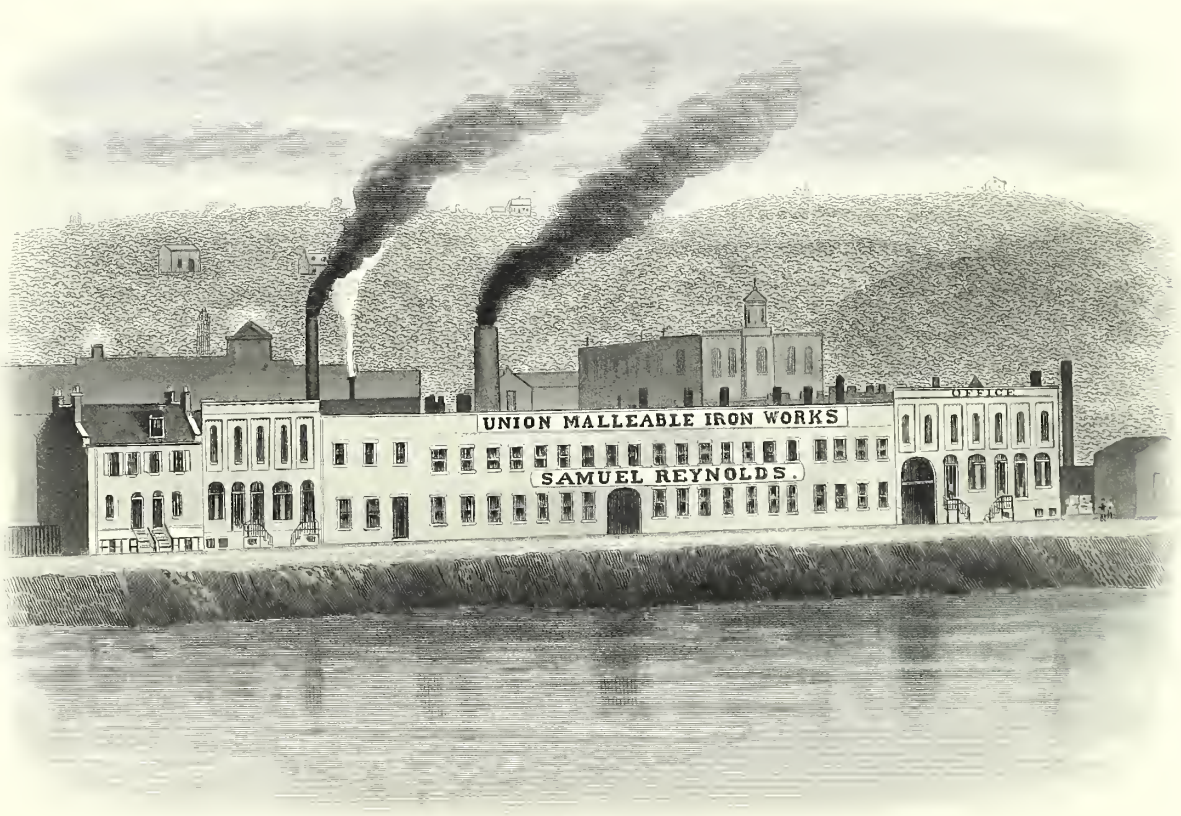
JOSEPH WALTON & CO., Coal Operators and Shipowners, Pittsburgh. This firm was founded by Joseph Walton, in 1860, under the name of the Eagle Coal Company. He was extensively engaged in the saw mill and lumber business, under the name of Walton, Philips & Co.; and, having a large capital tied up among the coal men, for whom he had built boats and barges, he invested with his associates in supplies of coal, which were then floated in boats to the lower markets. By this means they were rapidly introduced into the coal business about the year 1858. In 1860, they purchased the "S. B. Eagle" and barges, and embarked definitively in the coal business, forming a separate co-partnership under the name of the Eagle Coal Company, consisting of Joseph Walton, John O. Phillips, W. Mettenzwy, Peter Haberman and Joseph Keeling. Their business, the buying and towing of coal to Southern markets, was carried on with varied success until 1862, when the partnership was dissolved, and the boat and barges were sold to Joseph Walton, who was at this time engaged in furnishing large quantities of coal to the Government, at Cairo, Memphis and New Orleans. He continued this trade with remarkable success until 1865, having largely increased his facilities in the purchase of another large steamer, "The Coal City," and a number of barges; also a small steamer, the "Painter No. 2," but disposing of the "Eagle." During this period he was also, in connection with Thomas Fawcett, largely interested in filling Government contracts with coal bought and shipped in the same manner as in his individual business; this adventure was of a very extensive and successful character; under one contract they supplied coal to the amount of 2,000,000 bushels. In 1865, the affairs of this company were satisfactorily terminated, and the coal works situated at West Elizabeth, purchased by Walton & Fawcett, were sold to Joseph Walton for the sum of $80,000. At this time the Coal City Coal Company was formed by him, with a stock in trade consisting of the coal works at West Elizabeth, the steamers "Coal City" and "Painter No. 2," and a number of flats and barges. The co-partnership then organized consisted of Joseph Walton, Joseph Keeling and Peter Haberman, of Pittsburgh, with Robert B. Smith, of Cincinnati, who had a depot in that city and was carrying on a retail business there. The object of the co-partnership was the mining and shipping of coal to Cincinnati and its retailing there. The affairs of this company were not very prosperous. In the first place, the coal works, at the time they were purchased, were in a very bad condition, on account of insufficient drainage and ventilation, and great expense and delay were occasioned in getting them worked up to a proper condition. The necessities of the case required the purchase of large tracts of coal land, and the opening up of another works at the opposite end of the tract, with all its appurtenances, such as inclines, tipples, new improvements, dwellings for miners, stables and engine house, and a mile of outside railroad track, upon which a locomotive is used. Then, again, business was so depressed, with an excessive supply of coal in the Southern markets, that nothing could be made upon the prices realized. During this partnership, besides buying coal lands and opening up a new works, a large property was purchased in Cincinnati, upon which an extensive steam elevator was erected at an outlay of $125,000, to facilitate the retail business. During the continuance of this co-partnership the "Painter No. 2" was sold and the "Gipsy" purchased. Upon its dissolution, in 1869, and the purchase by Joseph Walton of R. B. Smith's interest, the Cincinnati property was sold and the retail business dispensed with. At this time the name of the firm was changed to that of Joseph Walton & Co., and was carried on by Joseph Walton, Peter Haberman and Joseph Keeling, until October 1st, 1872, when Joseph Keeling retired from the firm and Isaac N. Bunton was admitted, through the consolidation of the Niagara Coal Company, of which Joseph Walton, Peter Haberman and Isaac N. Bunton were members, with Joseph Walton & Co. The Niagara Coal Company owned the steamer "Niagara" and twenty-five barges, and carried on a coal shipping business in connection with Joseph Walton & Co., but on the consolidation it was all thrown together under the name and style of Joseph Walton & Co., Joseph Walton, the senior member, superintending the finances, Peter Haberman the coal works, and Isaac N. Bunton the steamboats and accounts. In 1872, a saw mill being deemed an essential element to the success of the business, a large one was erected on the property of the company at West Elizabeth and placed in successful operation, building coal barges and other vessels for the company, and furnishing building material for the surrounding country. On November 17th, after it had been in operation about nine months, a fire destroyed the entire building, with all its machinery, two fine mules and a large stock of lumber, causing a loss of upwards of $20,000, upon which there was only $5000 insurance. Work was immediately commenced on the ruins, and in four months another and better mill was in operation. The first was a

muly mill, but the present is a large circular saw mill, one of Stearn's patent: can cut daily 25,000 feet of lumber, and is furnished with all the facilities for handling and moving heavy timbers, such as railroad tracks, elevators, turn-tables, log-turners, etc. In 1872, the steamboat "Bengal Tiger" was purchased, making four boats belonging to the company. But in 1873, the business having increased to such dimensions that the boats were unable to perform the work, two more boats were contracted for, one to take the machinery of the "Niagara," the other to be entirely new. These boats, the "Joseph Walton" and the "Nellie Walton," came out in November, and were kept running constantly with all the rest up to May 1st, the "Joseph Walton" making in that time thirteen trips to Cincinnati and Louisville. Besides the two coal works at West Elizabeth, the company have another known as the Haberman Works, near Pittsburgh, in the first pool, which has been in successful operation for a number of years, and a new one just started, in the fourth pool, near Greenfield. Their facilities for mining and shipping are unsurpassed. At their own works they can run and load 40,000 bushels of coal per day, in addition to the nut coal and slack, and from November 1st, 1873, to May 1st, 1874, they shipped 4,000,000 bushels. The firm is now one of the largest engaged upon the river. They have six steamers, the "Coal City," "Bengal Tiger," "Joseph Walton," "Nellie Walton," "Gipsy" and "Alexander Foster," the first four being of the larger class, used for towing to the lower markets, and the other two for towing in the pools. They have also four coal works and about 600 acres of coal, with which are connected and owned by the company about 130 tenement houses used as dwellings for their miners. At their central works, at West Elizabeth, about twenty miles from the city, on the line of the Pittsburgh, Virginia & Charleston Railroad, they have erected a fine and commodious hotel building of four stories, containing upwards of fifty rooms, called the Walton House, the first floor of which is occupied by the company with a general store, conducted by David Lynch, under the name of Walton, Lynch & Co., where the miners are supplied with all the necessary wants of life. At this point is also located their steam circular saw mill, conducted under the able management of Captain Uriah Walton, brother of the senior member of the firm; it is extensively engaged in manufacturing lumber into coal barges and other crafts, the company having built upwards of eighty since its erection, besides furnishing bill lumber in large quantities to the surrounding country. In addition to their steamboats, their floating property consists of 150 coal barges, valued at $1200 each; 45 coal flats, valued at $500 each, and 50 coal boats, valued at $800 each. In all, a capital of $375,000 is employed simply in transporting their products to Southern markets. In conducting this immense business, about $900,000 of capital is employed, and when in full operation, including the men engaged on the steamboats, there are fully 1000 hands employed.

HON. JOSEPH WALTON was born in Westmoreland county, Pennsylvania, March 24th, 1826. His grand-uncle, George Walton, was one of the signers of the Declaration of Independence. His father and great-grandfather were born and raised in Philadelphia; the former carried on the business of millwright and bridge-builder, and built the first bridge over the Allegheny river, also the first mill, now known as Hill's Mill. He also built the two bridges over the Tuscarora and Muskingum rivers, in those days considered great feats. Joseph Walton, like most boys in those times, did not have many advantages of education showered upon him, but showed a strong natural aptitude for business; and, having learned something of his father's trade, he left home when only fourteen years of age to make a name for himself. He went down to Cincinnati and began work at the carpenter trade, which he had determined to master. At the age of nineteen, being a good workman, with strong practical ability and business tact, he engaged himself as millwright, and was soon very successful. Associating himself with a German builder, he constructed several houses and erected a number of saw mills, some of which are running to this day. Moving to Pittsburgh, he was soon engaged in a series of business operations in erecting and working saw mills, in which he was eminently successful. A peculiar episode in his life, and one to which he attributes the remarkable success of his future career, occurred about this time. He had been employed as millwright in the rolling mill of James Wood, in Temperanceville, which was paying him the very highest wages. Having been noticed by old Judge Heath, who was carrying on a saw mill at that point, as possessing an abundance of pluck, energy and vim, which the judge well knew were the elements of success in a business man, young Walton was prevailed on by him to leave Wood and enter his service, at a reduction upon the wages he had been receiving. The action appeared strange on the part of a young man working for wages; but he was looking ahead to something more than his then dependent condition, and



Joseph. Walton



UNION MALLEABLE IRON WORKS

S. Reynolds & Co. Proprietors. Allegheny City, Pa

it proved the turning point in his life, as the judge was soon convinced of the success of his choice; and it was but a short time until he made him his partner and placed him in full charge of his business. In 1858, he engaged in the coal business, which, under his sagacious management, soon became prosperous. During the war he filled extensive contracts with the Government, having filled the largest contract ever furnished by any single firm. No distance was too great for him to travel, no fatigue considered in accomplishing his purposes. He is truly a bright specimen of a self-made man, who unites great practical qualifications with a persevering and energetic disposition. With his popularity as a business man, he soon came prominently before the people as a representative one, and in 1870 was elected to the Legislature on the Republican ticket and served one term. After returning to Pittsburgh he devoted himself personally to the coal in connection with the lumber business, which he has carried on with success ever since, largely increasing and extending his business until it has now attained mammoth proportions. He has been a member of the School Board for seventeen years, devoting his spare time to furthering the cause of education, his experience making him keenly alive to the advantages of mental training. He is a prominent member of the Masonic order; President of the Keystone Glass Company; a large stockholder in the glass business of Stewart, Estep & Co., and was for four years one of the principal members of the firm of Chess, Smythe & Co., rolling mill, nail and tack manufacturers. He was among the original organizers of the First National Bank, of Birmingham, and is director of several banks and insurance companies in Pittsburgh and Allegheny. He was among the first organizers of the Pittsburgh, Virginia & Charleston Railroad Company, and has been a director ever since. No matter what speculation he has entered, he has always brought to it weight and power, contributing by his wonderful sagacity to the prosperity of every enterprise with which he is associated. But, while pursuing a mercantile career, he has not been unmindful of the calls of religion. Some eighteen years ago he opened a Sunday school in Birmingham, himself taking the superintendence. In the centenary year of Methodism he made a liberal donation to erect a church in the borough of Birmingham, on the lot where the school had been established, and in compliment to him it was named after him, "The Walton M. E. Church." It has now a regular pastor and a membership of 300. In appearance, Joseph Walton is tall, well-proportioned, with a countenance exhibiting great strength of will and intelligence. He has a frank and pleasing address, being proverbial for his uniform courtesy and genial disposition. As a conversationalist he possesses rare powers, having an easy flow of language, great natural wit and an unlimited store of anecdote. He was married to Annie Fawcett, daughter of James Fawcett, President of the First National Bank, of Birmingham, August 8th, 1858, and has a family of five children, two boys and three girls; he has lost two, a son and daughter, by death. Liberal to the poor and other charitable causes, among them the church of which he is a member, he makes a noble use of his ample means.

THE UNION MALLEABLE IRON WORKS, Samuel Reynolds & Co., Proprietors, are located on River avenue, Allegheny City, Pennsylvania, and are devoted to the manufacture of every description of saddlers' hardware. The establishment was founded, in 1862, by the senior partner, and the capacity of the works has been steadily increased until they at present rank among the most important in this line in the United States. The buildings are very commodiously and most substantially built of brick and stone, two stories high, and have a front on River avenue of 250 feet, with a depth of 110 feet to Saw Mill alley, thus giving a space on the two floors equal to one and a quarter acres. The building is bounded by three public thoroughfares. The amount of capital invested is $175,000, and one hundred and twenty hands are constantly employed.

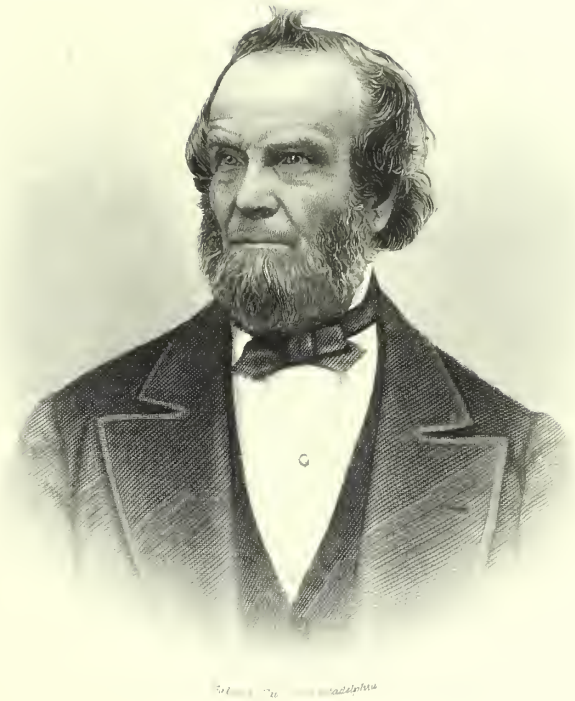
SAMUEL REYNOLDS was born in Staffordshire, England, October 10th, 1810. Having received but a limited education, he was at the age of ten years apprenticed to a moulder. When he attained his majority, he went to France, where his brother—who was the first to introduce the manufacture of malleable iron in that country—was carrying on a business of his own at Ponteau de Mere. After sojourning in France for a number of years, he came to America, in 1842, and established a foundry on Wood street, Pittsburgh, being associated with William H. Clark. In the great fire of 1845, the establishment was destroyed; and, being unable to resume business, he became an operative in the Government Shops at the United States Arsenal. In 1849, in connection with three other practical workmen, he established the saddlery hardware firm of Eaton, Olnhausen

& Co., which afterwards became known as Ohnhausen, Crawford & Co., Allegheny City. In 1862, he withdrew from the firm and founded the Union Malleable Iron Works. He is a self-made man, but the success that has crowned his years of toil, industry and perseverance, has been too marked to require the poor emphasis of praise. He was married, in 1832, to Hannah Ford, of Staffordshire, who has brought him eleven children, of whom seven are yet living.

ALFRED McLEAR'S CARRIAGE FACTORY, Westchester. The proprietor of this, the largest establishment of the kind in Chester county, commenced operations in 1862, at that time giving his whole attention to the repair of vehicles. His place of business was a small shed, on the same lot now occupied by his extensive factory, and the total amount of cash capital originally invested was but $150. During the first year he was assisted by two hands, which number he increased to four during the next year. In 1864, he purchased the property, and some months thereafter enlarged the building, besides erecting a frame structure, 50 by 60 feet in size, for a wheelwright shop. In 1867, he commenced building carriages, and during the first year disposed of about forty. Meanwhile, he continued his business of repairing, which he made a distinct feature for eight years. In 1869, he erected a brick building three stories high, measuring 90 feet by 217 feet. He has increased his production of carriages 400 per cent. since the inception of the business, and employs quite a large force of workmen. The amount of capital now invested is $25,000. The ware-room contains a number of fine carriages of all descriptions; one particularly worthy of notice is the "Mellingen Patent Jump-seat Buggy," the right to manufacture which in Chester and Delaware counties is held by the proprietor of this factory, who has improved upon the patent. The material used in the business comes from Ohio, Pennsylvania and New York, and is of the best quality. He also employs none but the best workmen, and to these facts he attributes the success which has ever attended him. He still continues repairing of all kinds, and gives employment to quite a number of hands in this branch of the business.

ALFRED McLEAR was born in Willistown, Chester county, Pennsylvania, August 4th, 1829. He learned the trade of a wheelwright and carriage builder in the Chester Valley, and has always given his sole and undivided attention to the same. Being a practical and intelligent workman, he is his own foreman and superintendent, and is able to devise improvements of importance from time to time.

STEWART & CO., Wire Manufacturers, have their establishment in South Easton, on the banks of the canal of the Lehigh Coal & Navigation Company. The works were originally started about 1837, for the manufacture of nails, the projectors of the enterprise being John Stewart, Charles Rodenbough, John Green and others. Their nails they made from the best Juniata bloom iron; and when, in consequence of the high price of this first-class material and also of other parties manufacturing from inferior stock and underselling the market, it became a question of relinquishing their rule or using a poorer class of iron, they abandoned the nail trade and entered upon the manufacture of wire, still rigidly adhering to the policy of using none but No. 1 material. The works at first produced about 25,000 bundles of wire annually, and the increase has been steady but gradual until they now turn out fully 100,000 bundles each year. At first forty-five hands constituted their entire force; now 175 find constant employment. In 1860, in order to meet the demands of their increasing trade, it was necessary to add another mill to the works, and in 1870 still another addition was requisite. The buildings are now known as Mills No. 1, 2 and 3; they have a frontage of 1100 feet and are run entirely by water power from the Lehigh Coal & Navigation Company's Canal. The firm have now in operation three rolling and three wire mills, and employ about $215,000 capital. The owners use nothing but the best charcoal blooms in the manufacture of their wire; this they obtain principally in the States of Pennsylvania, New York, New Jersey and Maryland, though some comes from as far off as Canada. In 1852, Charles Rodenbough retired from the firm, and the business title then became Stewart & Co. In 1864, John Stuart relinquished his active connection with the mills. They are now run by Charles Stewart, E. H. Green and Clement Stewart. The natural result of the care taken in the preparation of their wire is seen in the high reputation which it enjoys and the excellent price which it always commands. The individual members of the firm have ever given their personal supervision to every detail of the work, leaving nothing to outside superintendents.



Samuel Reynolds

Lewis Cross, General Storekeeper, Philadelphia.

GLOBE PLOW WORKS, Alexander Speer & Son, Proprietors, are situated on Duquesne way, Pittsburgh. The business was founded in 1828, by Samuel Hall, who commenced the manufacture of plows in a one story building on the corner of Penn avenue and Cecil alley; his capital was about $200, and he employed one journeyman. A practical mechanic and shrewd man, his business, successful from the start, increased so rapidly that in 1836 he found it necessary to enlarge the capacity of his establishment. Accordingly he erected a commodious manufactory in Manchester, two miles below the city, still keeping his old stand for an office. In 1845, Alexander Speer became a partner with him under the firm name of Hall & Speer, and, upon the death of the senior partner, the latter conducted operations under the same title until 1873, when, the last of Mr. Hall's heirs withdrawing, the firm became Alexander Speer & Sons, William W., the eldest son, having been taken in in 1869, and John T. Speer, the younger, in 1873. The products of this establishment, besides about 200 varieties of plows, embrace a large number of other agricultural implements. In 1870, the whole business was removed from Manchester to its present site, which extends from Fifth street along Duquesne way to Cecil alley, giving a frontage on the Allegheny river of 240 and extending back 270 feet, making almost an acre and a half, all of which is under cover and comprises a foundry, polishing room, machine shop, carpenter shop, and planing mill to prepare the wood work for the various articles; a mounting room and an immense store room on the upper floor (reached by a steam elevator), where their heavy stock is packed away. This establishment is the largest of its kind in Pittsburgh, and one of the largest in the United States. Its success has been remarkable, and is entirely owing to the excellence of the goods of the house and its strict integrity in all business relations. Since 1849 it has operated on a strictly cash basis, settling all accounts on the first of every month. The war for a time cut off its large trade with the South, but this has been almost entirely recovered, while the connections in other directions are daily extending.

ALEXANDER SPEER was born in Allegheny county, Pennsylvania, June 25th, 1808. His father was a carpenter in humble circumstances and able to give his son only a rudimentary education. At the age of seventeen the lad was apprenticed to the trade of wagon and plow making, after learning which he started, with but ten dollars, to seek his fortune in the world. Having worked as journeyman at his trade for two years in Natchez, Mississippi, he began trading in a flat-boat on the Mississippi, dealing in goods and implements of Pittsburgh manufacture. Though not always remunerative, he followed this calling for about fifteen years. In 1845, he became associated with Samuel Hall in the Globe Works, and on the death of his partner, in 1852, succeeded him as the head of the establishment, managing the business under the firm name of Hall & Speer until 1873, when the title was changed to Speer & Sons. In 1837, he married Sarah Wherry, of Pittsburgh, and their two only children are the sons now associated in partnership with him.

LEWIS GROSS' CURING, PACKING AND SMOKING ESTABLISHMENT is located at No. 810 North Twenty-sixth street, Philadelphia. It dates from the year 1862, when it was founded by its present proprietor, a practical victualler of many years standing. Thoroughly realizing the importance of effecting a good location in the rapidly growing city, he selected the site of his present buildings having an eye to its prospective value, the excellent drainage so necessary to business of this nature, and, above all, sufficiently near the trade centre and at the same time removed from a densely built neighborhood. The premises comprise a lot 120 feet front on Twenty-sixth street, extending westward 180 feet. A fine residence, three stories high, fronting on Twenty-sixth street, extends a distance of 90 feet, in the rear of which are the slaughter and packing houses. Under ground, quarried out of the solid rock, and with the finest drainage toward the Schuylkill, are the cellars for storing. These are 28 feet deep and divided into two stories. A portion of the upper story of the cellar is devoted to the purposes of an ice house, and this part extends upward above the level of the ground 12 feet. The dimensions of the cellar are 96 feet front on Taney street by 72 feet east and west. It is remarkably cool and dry, and well adapted to packing, pork having been perfectly preserved here throughout an entire year after slaughtering. From 120 to 150 hogs are weekly killed, and four men are constantly employed. The trade is partly local, while considerable quantities of bacon and hams are shipped South annually. A large amount of sausage meat is made, the most approved and labor-saving machinery being used in its preparation. For the

purpose of properly smoking the meats, hickory wood is exclusively used, with an admixture of mahogany saw dust, and very great care is taken to maintain and continue the reputation of the establishment for the excellent quality of the hams furnished. The perfect drainage which exists on the premises, together with the liberal use of the Schuylkill water, insures great cleanliness, while neatness and order characterize the entire establishment.

LEWIS GROSS was born in the town of Ludwigsburg, Germany, November 11th, 1825, and was brought to the United States by his parents in 1832, who returned thither in 1838 for a two years visit. He received a very good education both in his native place and Philadelphia; and as his father was of the same calling as is his present avocation, he learned the business of a victualler under the parental care. At the age of twenty-three he entered into business on his own account, and has had a highly prosperous career. He was at first located in Parrish street, between Thirteenth and Broad streets, subsequently removing to Coates street, between Twenty-third and Twenty-fourth streets, and occupying stalls in the old sheds on Market street, near the corner of Sixth street. His present retail sales are made in the Twelfth Street Market House, at the corner of Market and Twelfth streets, where he employs four contiguous stalls for his business, Nos. 128, 130, 132 and 134.

THE ADAMS & PERRY WATCH MANUFACTURING COMPANY, Lancaster, was organized in June, 1874. During the same month John C. Adams and Edwin H. Perry, both prominently identified with the Elgin Watch Company (the former as the founder and the latter as designer of machinery of that institution), visited Lancaster, having in view the establishment of a similar enterprise; and, having secured the assistance of several prominent capitalists of Lancaster, the above named gentlemen at once effected an organization with the following named officers: Edward J. Zahm, President; John Best, Vice-President; John B. Roth, Treasurer; John C. Adams, Secretary and Manager; Edwin H. Perry, Superintendent and Consulting Engineer; and George Preston, Assistant Superintendent. The buildings were designed by C. L. Stiles, an architect of ability from Chicago, and are now (December, 1874) being rapidly pushed to completion. Early in August, 1874, at a meeting of the stockholders, to select a location for the buildings, several eligible sites were discussed, and finally a selection was made of ground on West End avenue, between the Marietta and Columbia turnpikes, embracing over three acres. It has a frontage on the Columbia pike of about 350 feet, was a donation to the enterprise by C. A. Bitner, one of the most enterprising and public-spirited citizens of Lancaster, and is the heart and centre of a most valuable tract of city land owned by that gentleman, who is one of the principal stockholders in the company. The capital stock of the company is $100,000. The buildings are in the form of the letter T; the centre building is 40 feet square and three stories high, and the wings are each 50 feet by 28 and two stories in height. The main building will be surmounted by a handsome clock, with five-feet illuminated dials, and the estimated cost of the entire edifice is $25,000. The corner-stone was laid, October 27th, 1874, with appropriate ceremonies, in the presence of a large concourse of citizens, and the occasion was marked by great enthusiasm. The machinery for the manufacture of the several parts of the watch is now being rapidly prepared under the personal supervision of Edwin H. Perry, aided by a corps of skilful mechanics, all of whom have been identified with the various prominent watch companies of the country. The machinery is of the most delicate and intricate pattern, of an exceedingly expensive class, and is one of the large items of expenditure in the establishment of an enterprise of this kind; much time, money and labor must necessarily be expended in its manufacture. It is confidently expected that the buildings will be ready for occupancy early in the spring of 1875, when active operations will be immediately commenced. It is the design of this company to manufacture a watch which will compete with the very finest imported articles, and the confidence in its able projectors is such that the capital stock could be doubled, if desired. John C. Adams, the Secretary and Manager, has had a large and varied experience in the various manufactories of a similar character in the country, and Edwin H. Perry, the Superintendent, is also thoroughly conversant with all the intricate details of his important department of the enterprise. Finally, it is a safe assertion to make, that no manufacturing enterprise has ever started under more favorable auspices.

EDWARD J. ZAHM, the President of the company, was born August 31st, 1831, in the city of Lancaster. He graduated from the High School of that city at the age of thirteen, and immediately

PALACE YARD, DUBLIN.

Government Office, Upper Castle Yard, Dublin.

entered the jewelry establishment of his brother as an apprentice; after serving seven years, he for a year and a half continued as a clerk in the same place. He formed a business partnership with H. L. Zahm in 1854, and engaged in the jewelry business on the corner of Centre square and North Queen street, at which location they continued until 1864, when they purchased a large property on the opposite corner; this they remodelled and fitted up to enable them to meet the demands of their ever-increasing business. The firm continued as originated until 1870, when, upon the withdrawal of H. L. Zahm, the business was assumed entirely by E. J. Zahm, and is now one of the largest in this line in the city. Mr. Zahm has never interested himself in politics, but has been active in local improvements and institutions, especially those devoted to educational purposes. He has been an active trustee of Franklin and Marshall College for many years, and also a trustee of the Theological Seminary. He was one of the originators and managers of the Lancaster Inquirer Printing and Publishing Company; was a director and stockholder of the Lancaster County Mining Company. He is a prominent church member, a highly respected citizen and a man of fortune. On the organization of the watch company he was induced to identify himself with it as a stockholder, and the position of President was at once conferred upon him, and he is now expending his best energies as well as his money for the success of the enterprise.

J. C. ADAMS, the Secretary and Manager, was born in Syracuse, New York, October 7th, 1834, and at the age of eight years he with his family removed to Chicago, where he received his early education in the public schools. He is of American parentage, his father being an old resident of Troy, New York, and formerly connected with the *Albany Journal*. At the age of fifteen he left school to go to the watch-making business with John H. Atkin, of Chicago, who was a skilled workman, formerly of Liverpool, England. He served with him five years, mastering the business in all its details, and then removed to Elgin, Illinois, where he formed a partnership with G. B. Adams in the watch and jewelry business. Three years later he formed a connection with the firm of Miller & Co., Chicago, in the same business, making the watch department his specialty. In 1864, he organized the Elgin Watch Company, at Elgin, Illinois, and since then has been prominently identified with the leading watch companies of the country. He remained at the head of the flourishing enterprise at Elgin a period of about three years, and through his energy and business tact brought it up to the front rank of the watch manufactories of the country. Leaving that company, he organized the Springfield, Illinois, Watch Company, and placed it on a successful footing. Then he spent about three years in travelling. In the summer of 1874, he conceived the idea of organizing a like enterprise in some one of the Middle States; and, after visiting several localities, finally selected the city of Lancaster, where he made known his intention to some of the local capitalists, who, seeing a profitable investment for their money, lent ready assistance, and to-day through his efforts there is being pushed to rapid completion an establishment that promises to eclipse any of his former attempts in the same direction. He is aided and seconded by his skilful associate, E. H. Perry, who has also been most prominently identified with various prosperous manufactories. He was married, January 29th, 1857, to Maggie Irwin, of Pittsburgh, whose parents were old and prominent residents of that city, and has a family of three children, two sons and one daughter. He has identified his interests with Lancaster city, and proposes to make it his future residence.

E. H. PERRY, General Superintendent and Consulting Engineer of the works, was born in Holliston, Massachusetts, on February 26th, 1830. He was educated at Wilbraham Academy, and at the age of seventeen he entered the machine works at Southbridge, Massachusetts, as an apprentice. After serving two years he was engaged for two years as model maker at Springfield Armory. He was next employed for one year with the Corliss Steam Engine Company of Providence, Rhode Island. In 1853, he commenced with Sacket, Davis & Co., manufacturers of jewelry, of Providence, Rhode Island, as inventor of machinery and tools, and produced some very valuable inventions in the chain making department. After continuing here for eight years he was for the next two in Government employ as Inspector of Arms. In 1862, he engaged with E. Howard & Co., of Boston, and, as designer of machinery for the manufacture of watches, remained for six years. Accepting a similar position in the National Watch Company, of Elgin, he continued in it until June, 1874, when he removed to Lancaster, to identify himself with the Adams & Perry Company. The watch which this company propose to manufacture is of Mr. Perry's invention, and it has received the encomiums of experts both at home and abroad. His mechanical genius was early displayed, and was fostered

and cultivated by his father, also a skilled master mechanic.

GEORGE PRESTON, Assistant Superintendent, was born at Chester, New Hampshire, June 5th, 1835, and there received his education. At fifteen years of age he commenced his trade of machinist at the locomotive works at Manchester, where he served five years. In 1864, he was engaged with the National Watch Company, at Elgin, Illinois, and there continued for ten years, when he removed to Lancaster in order to identify himself with the Adams & Perry Watch Manufacturing Company. He is a thorough master of his trade in all its branches, and is now superintending the manufacture of the machinery for the new factory. He served throughout the late civil war, and was with the 127th Illinois Volunteers.

THOMAS G. STODDARD, Superintendent of the Train Department, was born in Coventry, England, on July 31st, 1845, and was brought by his family to this country when three months old. He received his education in Boston, and at the age of fifteen was apprenticed to the trade of machinist, in which capacity he continued for three and a half years, when he commenced to work as a journeyman. For seven years he was in the employ of the Howard Watch Company. He removed to Lancaster in order to connect himself with the Adams & Perry Company in his present capacity.

CHARLES B. STILES, Foreman of the Machinery Department, was born in Elgin, Illinois, on February 25th, 1844. He received his education in the same town, and at seventeen years of age entered a jewelry establishment to learn the business of repairing. In August, 1861, he enlisted in the 36th Illinois Infantry, and served for three years. After his return he entered the employ of the National Watch Company, of Elgin, where he remained for four years, after which he travelled through the Eastern States for about two years in order to perfect himself in the details of his trade. In 1871, he returned and resumed his former post with the National Company, of Elgin, and there continued until July, 1874, when he removed to Lancaster to enter the employ of the Adams & Perry Company.

J. F. WRIGHT, Foreman of the Punch and Die Department, was born in Northampton, Massachusetts, March 13th, 1839, and was educated in Williamsburg, Massachusetts. At the age of sixteen he began the trade of machinist, and served for three years as apprentice and for one year as journeyman in Williamsburg. He then went to South Wyndham, Connecticut, and was until 1859 there engaged in the manufacture of paper-making machinery. He next entered the employ of the Florence Sewing Machine Company, at Northampton, Massachusetts, where he remained until 1861, when he removed to Philadelphia, and was engaged in the machinery department of A. Jenks & Son, manufacturers of arms, until 1864. In various establishments of Philadelphia he was employed until 1868, when he identified himself with the National Watch Company, of Elgin, Illinois, in the manufacture of punches and dies, there continuing until September of 1874, when he was engaged by the Adams & Perry Company, of Lancaster, in his present capacity.

E. F. EMORY, Foreman of Plate and Jewelling Department, was born at Newton, Upper Falls, Massachusetts, May 23d, 1842. He received his early education in Biddeford, Maine, and at seventeen years of age was apprenticed to the trade of machinist. After serving at his home for about two years he went to Springfield, Massachusetts, where he continued until 1864, when he received the Government appointment of Inspector of Arms, in which capacity he served until the close of the war. He then returned to the Springfield Armory, where he remained until 1867, when he went to Elgin, Illinois, to enter the employ of the National Watch Company, as Assistant Foreman in the Plate Department, and continued to hold that position until September, 1874, when the Adams & Perry Company secured his services as Manager of the same department, and he removed to Lancaster.

ALLEGHENY BREWERY, Lutz & Walz, Proprietors, Allegheny City. This enterprise was commenced in 1852, by Sebastian Heid and Zavier Walz, under the style of Heid & Walz, for the exclusive brewing of beer. The partnership lasted two years, when Walz purchased Heid's interest in the business, thus becoming sole proprietor. A few months afterwards he disposed of a one-half interest in the concern to Damas Lutz, and the firm became the present one of Lutz & Walz, the former taking charge of the brewery, while the latter managed a beer hall owned by the firm in Pittsburgh. The latter was disposed of some time since, and the firm are now only engaged in the manufacture of beer. The brewery is located at

the corner of Spring Garden and Chestnut streets, Allegheny City, and the amount of capital at present invested is $125,000. There are several buildings on the premises, all substantially erected, and fitted with the best and most approved appliances. One of these measures 108 feet in length and 50 feet in width, two stories high. Another is 140 feet long and 32 feet wide, three stories in height. The new addition to the brewery is 40 feet by 50 feet, and also three stories high. The warehouse for storage of material measures 25 feet by 36 feet, and is two stories high. The cellar for the seasoning of the beer is 250 feet long and 16 feet wide. During the first years of its inception the yield was 2000 barrels per annum. The business has ever proved a successful one, and the product has regularly increased until at present it foots up 11,000 barrels yearly. From fifteen to twenty hands are constantly employed.

DAMAS LUTZ was born in Wurtemberg, Germany, December 11th, 1822. His father was a man in fair circumstances. Damas was educated in Germany, and in 1849 emigrated to the United States to escape the military conscription ordered by the Government, which had for its object the extinguishment of the memorable Liberal revolution, in 1848–'49. On his arrival in this country he proceeded directly to Pittsburgh, where he labored at his trade of maltster and brewer, and subsequently at Wheeling, West Virginia. He returned to Germany in 1851, to visit his father. The following year he again embarked for America, and proceeded to Pittsburgh, whence he left for Cincinnati, where he sojourned a few months. He finally settled down in Pittsburgh, and followed his vocation as brewer until he received his patrimony from Germany, in 1854, when he invested the same, together with his own earnings, in the brewery as above stated. He was married, in 1852, to Crecencia Kleine, a native of Germany (born August 13th, 1824). With her he had eight children, four of whom are yet living. She died July 31st, 1873, universally regretted as a woman of amiable character and charitable deeds.

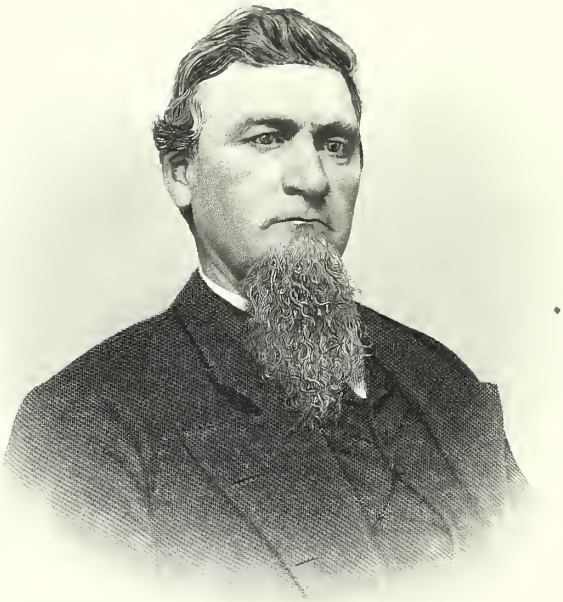
DYOTTVILLE GLASS WORKS, Henry B. Benners, Proprietor. This establishment was founded many years since by the late Dr. Thomas W. Dyott, who operated them at intervals until the disastrous failure of his "Manual Labor Bank," by which so many industrious citizens lost their all. After his conviction for fraudulent insolvency, the premises passed into other hands and were leased by Henry Seybert, a gentleman of wealth and culture, who had become interested in the glass business, not merely to give employment to the poor workmen who had been idle for several years and who had suffered heavily by the failure of the bank, but also to assist Eugene Roussel in obtaining a supply of bottles for his manufacture of mineral or aerated waters, then being introduced into the United States, and which required a very large stock of these vessels. In 1844, the lessee gave the charge of the works to the present proprietor, and after a short period he disposed of his interest in the establishment to Henry B. Benners, S. Decatur Smith and the late Quintin Campbell, Jr., who, under the style of Benners, Smith & Campbell, operated the same for a period of five years. The two latter named gentlemen then withdrew from the firm, and the senior partner associated with him his two brothers, both of whom are now deceased, and he is now the sole owner of the establishment. The manufacture of bottles has greatly increased since the introduction of soda or mineral water and kindred beverages; and these articles are made in almost every considerable town and city, from Maine to Texas and from the Atlantic to the Pacific. At the time the present proprietor commenced at Dyottville there was not a single wine bottle produced in the country, and porter bottles, which were already then extensively used, were imported from Bristol, England, and also from Germany. Very few demijohns were made, and very few carboys for the porterage of mineral acids. These are all now furnished at the Dyottville Glass Works, and the number turned out is enormous. Thirty years, a single generation, has worked a marvellous change; and where the trade heretofore depended upon a foreign market to supply their wants every article is now fabricated at these works and furnished at a far lower figure. The best of materials only are used, the most experienced artificers are employed and the implements necessary to the business are of the most approved description; consequently the Dyottville bottles are of superior quality and known as such all over the continent of America. For many years pulverized rosin was regarded as the best fuel, and the most economical, being cheaper than coal or wood; but when, owing to the civil war, the commercial value of rosin, etc., was enhanced, anthracite coal was substituted and is now the fuel used. The blow-pipe and shears, as used by glassmakers, are the same as those employed by the ancient Egyptians, 3500 years ago, and previous to the exodus of the children of Israel; paintings now

existing at Beni Hassan, on the Nile, executed in the reign of the first Osirtasen, represent Egyptians blowing glass. But in the moulds and presses great improvements have been made. Prior to 1826, a cylinder of clay composed the mould. At that date, however, Mr. Ricketts, of Bristol, England, invented the present iron mould—opening and closing with a hinge—which is now used in the production of all but champagne bottles, which are made in an iron cylinder and fashioned by the eye of the workman.

HENRY B. BENNERS was born in Philadelphia, October 14th, 1818, and is a son of George Benners and a grandson of Captain Jacob Benners, both of whom were natives of the same city. The latter was a successful shipmaster of the olden time, having commanded the ships "Dispatch," the "Susquehanna" (the first ship of that name owned by the late Thomas P. Cope), the "Superior," the "Kensington" and the "Margaret." He died, while in command of the latter vessel, from yellow fever, in Batavia, on the island of Java. George Benners, father of Henry B. Benners, was well known for his many voyages to the East Indies, as supercargo, in vessels owned by M. & S. N. Lewis, Joseph S. Lewis, Samuel Archer and others. Henry B. Benners received his education in the private schools of Philadelphia and in the High School of the Franklin Institute, under the late Professor Walter R. Johnson and others. In 1835, he entered the counting-house of the late John R. Neff, a leading merchant, who was identified with all the public institutions of his day. After receiving his mercantile education at this place, and his health becoming impaired—disease of the lungs being threatened—he sought a home in the South. In 1840, he embarked in business at Wilmington, North Carolina, and was most successful. On April 30th, 1843, a terrible conflagration laid waste one-third of that city, and he was among the victims, his store and residence being consumed. As his health had now become completely restored, he returned to his native city, where soon after he became identified with his present business.

THOMAS FAWCETT & SONS, Miners and Shippers of Coal, Pittsburgh. This business enterprise dates from 1850, when Thomas Fawcett became engaged in the towing of coal boats, then exclusively used for moving coal to market, the trade being in its infancy and no barges built. He continued floating coal in the old way until 1859, when he built the tow-boat "Ormsby," and commenced the towing of coal in barges, and also coal boats, to Cincinnati, Louisville, Cairo and Memphis. He abandoned the New Orleans trade in 1860, on account of the breaking out of the war, but supplied the Government with coal both at Cairo and Memphis. In 1862, he associated himself with Joseph Walton, and in March, 1863, purchased the steamer "Bengal Tiger," and in company with Walton transported a large amount of coal to supply the Government, until the conclusion of the war, when the partnership was dissolved (in 1865), and Walton purchased the mines and also the small tug "Jacob Paynter, No. 2." Fawcett continued the business on his individual account, it being the running of coal from Pittsburgh and all intermediate points to New Orleans. In 1867, he built the tow-boat "Boaz," which is still running. In 1865, he inaugurated the firm of Boyd, Wilmot & Co., in New Orleans, he being the "Co." This was for the purpose of carrying on a retail business, to supply the citizens, steamboats, etc.; and this co-partnership lasted till 1870, when Boyd retired and the firm became W. G. Wilmot & Co., consisting of W. G. Wilmot, John H. Irwin and Thomas Fawcett, which business is still continued. In June, 1871, Thomas Fawcett took his son, James T., into partnership, and then built the steamer "Acorn," which commenced running July 1st, 1872, being used to tow barges to New Orleans. The firm was then known as Thomas Fawcett & Son, which was eventually changed to its present appellation on July 1st, 1874, when another son, Thomas Fawcett, Jr., was admitted to partnership. Thomas Fawcett & Sons are the present owners of the steamers "Boaz," "Acorn," "Arrow" and "Oakland;" the last named is a magnificent steamer, with a handsomely furnished saloon for the accommodation of the officers. The firm likewise own forty-six barges and forty-four coal boats, and their operations, supplemented by their large floating property, are necessarily very important. The average amount of their shipments is about 2,000,000 bushels per annum, exclusively to Western and Southern markets.

THOMAS FAWCETT, SR., was born in Pittsburgh, May 27th, 1827, of English parentage, and received but a limited education. While very young he commenced a business career, and during the years 1842, '43 and '44 was a clerk for Mr. Blackman. After leaving the latter he started his own grocery store in Birmingham, which he conducted until 1850, when he embarked in his present avocation, the coal business. He is justly proud



Wm. McGilvary

of his success, which has been obtained by the exercise of judgment and enterprise. He is of very considerate manners, and enters with a characteristic earnestness into any business which may offer itself to his notice.

WILLIAM McGILVRAY & CO.'S Foundry and Machine Shops, at Sharon, Pennsylvania, were commenced in 1854, by the present senior member of the firm. He was joined, in 1861, by Samuel Kimberly and James Westerman, who still continue as partners and are included in the "Co." The works are located on Water street, west side of the Shenango river, in the neighborhood of S. Renan & Co.'s foundry. The premises consist of three acres of ground, on a portion of which are erected the buildings required to carry on the various manufactures. Included among these is a foundry, measuring 70 feet by 50 feet; also a machine shop, 65 feet long and 45 feet wide. The articles produced are chiefly blast furnaces, rolling mill and coal bank supplies. The force of men employed varies from twenty-five to fifty. At present the works are in good condition, and, notwithstanding the existing financial depression, are doing a fair business.

WILLIAM McGILVRAY was born within the limits of the present city of Allegheny, Pennsylvania, December 15th, 1824, and is the son of Alexander and Elizabeth (Cameron) McGilvray. Both parents were natives of the Highlands of Scotland, and emigrated to the United States in 1808. His father, after reaching Pittsburgh, entered the employ of the late Bishop Hopkins as gardener, and subsequently served the Hon. Harmar Denny in the same capacity. The latter became so much interested in his employé's advancement and success that he sent the son, William, to the Western Theological Seminary, where he passed two years in study. His friends designed him for the law, but young McGilvray's tastes did not accord with his friends' choice. Having a decided inclination for mechanical pursuits, he learned the blacksmith's trade in Allegheny City, and to better his condition went to Sharon in 1850, where, as a stockholder and director of the Jackson Iron Company, he remained until 1854, when he purchased the land and erected the works which now bear his name. Both in this establishment as well as in other enterprises with which he has been connected he has been very successful; for he possesses in large measure the perseverance and determination of purpose that overcome all obstacles. Starting in the battle of life devoid of pecuniary means, he has by his indomitable energy and industry won a competence, and with honest pride can assert that he is in debt to no one. Though not of the wealthiest, he has exerted himself to foster the business interests of the town, and has taken an active part in all public enterprises. He is a large stockholder both in the Sharon Gas Company and the Sharon Savings Bank. He was married, in 1845, to Rebecca Ewing, of Greensburg, Pennsylvania, and has six children living.

PITTSBURGH & CASTLE SHANNON RAILROAD COMPANY, with which is connected the working of the largest coal mines near Pittsburgh, organized in November, 1871, under the management of Milton D. Hays, the President of the corporation; and having succeeded in disposing of the capital stock of $1,000,000, wherewith was in part purchased 1000 acres of land within thirty days, at once made arrangements to improve the same. The company has constructed six miles of main road and nearly two and a half miles of branch road and sidings. It has placed thereon six locomotives, with a full complement of passenger and coal cars, bringing to the city about 700 car loads of coal per day, which is mostly sold and consumed by the large local rolling mills. The company employs some 500 hands, including miners and railroad operatives. The country through which the line passes is very beautiful and well adapted for agricultural purposes, or suburban residences, and upon it the company has already laid out several farms and villages. It has also disposed of property to the amount of nearly $300,000, and still owns 1000 acres of coal lands, which cost about $300 per acre, including coal and surface; the latter—surface—is now selling from $600 to $1500 per acre, according to locality. It is contemplated to extend the road to Waynesburgh, a distance of thirty-five miles south of the present terminus. It will cross the Hempfield Railroad at a point known as Belleville, in Washington county, and the line will pass through seventeen miles of solid coal-bed and limestone. The coal mined by the company exhausts thirty to fifty acres annually, with a constantly increasing demand; the trade is purely local, being confined to Pittsburgh, Birmingham and Allegheny City. It is apparent that this company

possesses a decided advantage over all others, having its own railroad and coal mines under one management. The officers consist of M. D. Hays, President; Dr. James Kerr, Vice-President, and Josiah Reamer, Secretary and Treasurer. The general office of the company is at No. 75 Fourth avenue, Pittsburgh, Pennsylvania.

MILTON D. HAYS, President, was born in Pittsburgh, June 29th, 1844, and is the son of Jacob Hays, a well-known, respected and prominent lumber merchant. He had the rudiments of an ordinary education, which he subsequently supplemented by attendance at night-schools. When but sixteen years old, he left home and embarked in the oil business, associating himself with Frank Goodwin. They possessed a very small capital, but by unwearied exertions they succeeded in carrying on a progressive business, which became remunerative. The co-partnership lasted about a year, when Goodwin withdrew and Josiah Reamer became a partner, changing the style to Reamer, Hays & Co., which subsequently was merged into the Empire Oil Works. These were maintained for about two years, when he became the exclusive owner, and afterwards sold out to Lidy & Shorpenning. He embarked, in 1863, for California, in the steamer "Ariel," and, after passing one year there, returned to Pittsburgh and took an interest in the lumber establishment of J. & A. Hays & Co., of which he was the financier for seven years. During a portion of this time, however, he was connected with Redman & Co., lumber merchants, and proprietors of one of the largest establishments on the Monongahela river for building boats. After the death of John Redman, he administered the estate, and attended to the financial business of some five other lumber establishments connected with the estate. In 1871, when only twenty-seven years of age, he was elected President of the Pittsburgh & Castle Shannon Railroad Company, which he helped to organize and of which he is the largest shareholder. When he was but twenty-two years old, he was elected a director of the Farmers' and Mechanics' Bank, and two years later Vice-President of the same, which position he held until his other business engagements so engrossed his time and attention that he was obliged to resign his office. He was one of the originators of the Charleston & Virginia Railroad, securing the first stock ever sold. He has frequently been tendered offices of trust in the political world of Pittsburgh, but has persistently refused them, preferring to give his undivided attention to his private business.

JAMES KERR, M. D., Vice-President, was born in Westmoreland county, Pennsylvania, October 9th, 1814. His parents were of Scottish descent, his paternal grandfather having originally settled there in 1793, and built a saw mill. Dr. Kerr was educated at the Greensburg Academy, and after leaving the school commenced the study of medicine with Dr. David Porter. He subsequently took his degree at the Medical College of Ohio, in Cincinnati, and commenced the practice of his profession at Pittsburgh, in 1844, which he successfully prosecuted until 1861. On the breaking out of the Rebellion, he was appointed a Surgeon of the 33d Regiment United States Volunteers, afterwards known as the 62d Pennsylvania Volunteers, commanded by Colonel Black. He was Brigade Surgeon for two years, and his full term of service in the army was three years; he was the only medical officer in the division who served the full term. After his discharge he resumed his practice in Pittsburgh. In political principles he is a Democrat, and was the candidate of that party in 1860 for Congress. He was elected Vice-President of the Pittsburgh & Castle Shannon Railroad Company in 1871. He has been for many years a member of the Allegheny County Medical Association.

JOSIAH REAMER, Secretary and Treasurer, was born in Westmoreland county, Pennsylvania, May 22d, 1830. His grandfather was among the earliest settlers of that region of country. He received his education at the Greensburg Academy, and when nineteen years of age left it to become a clerk in a country store, at a salary of $50 per annum and board. He remained there one year, and next proceeded to Pittsburgh, where he effected an engagement as a clerk in a dry goods establishment. He next became book-keeper in a wholesale dry goods house, and shortly after, in 1856, was admitted a partner in the same. He subsequently engaged in the iron business, and in 1871 was elected to his present position.

HENRY ANSHUTZ & SON, Manufacturers of Grates, Fenders, Cook Stoves, Heating Stoves and Parlor Stoves, occupy stores No. 214 Liberty street, Pittsburgh, and No. 196 Ohio street, Allegheny City. The business originated in a small foundry situated at the corner of North and Ohio streets, Allegheny City, in the year 1844, where Christian and Philip Shancrs, with Henry Anshutz, gave employment to four or five men. The firm remained

Benjn Crowther

unchanged until 1856, when Henry Anshutz became sole proprietor. The rapid spread of the business necessitating a removal to more extended premises, the present site, in the Eighth Ward of Allegheny City, was selected. The building, which measures 170 feet by 240 feet, is two stories in height, comprises a moulding room on the ground floor, 125 feet long and 62 feet wide, and a fitting shop of the dimensions of 133 feet by 40 feet. The upper story is used as a pattern shop. In addition to these, there are extensive outbuildings, where the enamelling and finishing is done. At present employment is given to about thirty men, who manufacture yearly 2500 stoves, and the same number of grates and fenders. A few years since the senior partner retired from active business, the sole control being placed in the hands of his two sons, John H. and C. W. Anshutz; the former taking charge of the commercial part of the enterprise, while the latter assumed the supervision of the foundry. On the death of John H. Anshutz, his brother, C. W. Anshutz, became his father's active partner, and has continued to act in that capacity.

HENRY ANSHUTZ was born in Zinzerville, Alsace, in the year 1812, where he was educated and where also he learned the trade of a pattern maker. In 1832, he emigrated to the United States and found employment at the machine works of Robson & Minnis, Pittsburgh, as foreman, and with whom he continued until he became interested in his present business. As a mechanical draughtsman, he exhibited great ability, and interested himself largely in imparting his varied knowledge to the youth of Pittsburgh and vicinity. By untiring industry he has risen to the position he now occupies, and enjoys the esteem of his fellow-citizens.

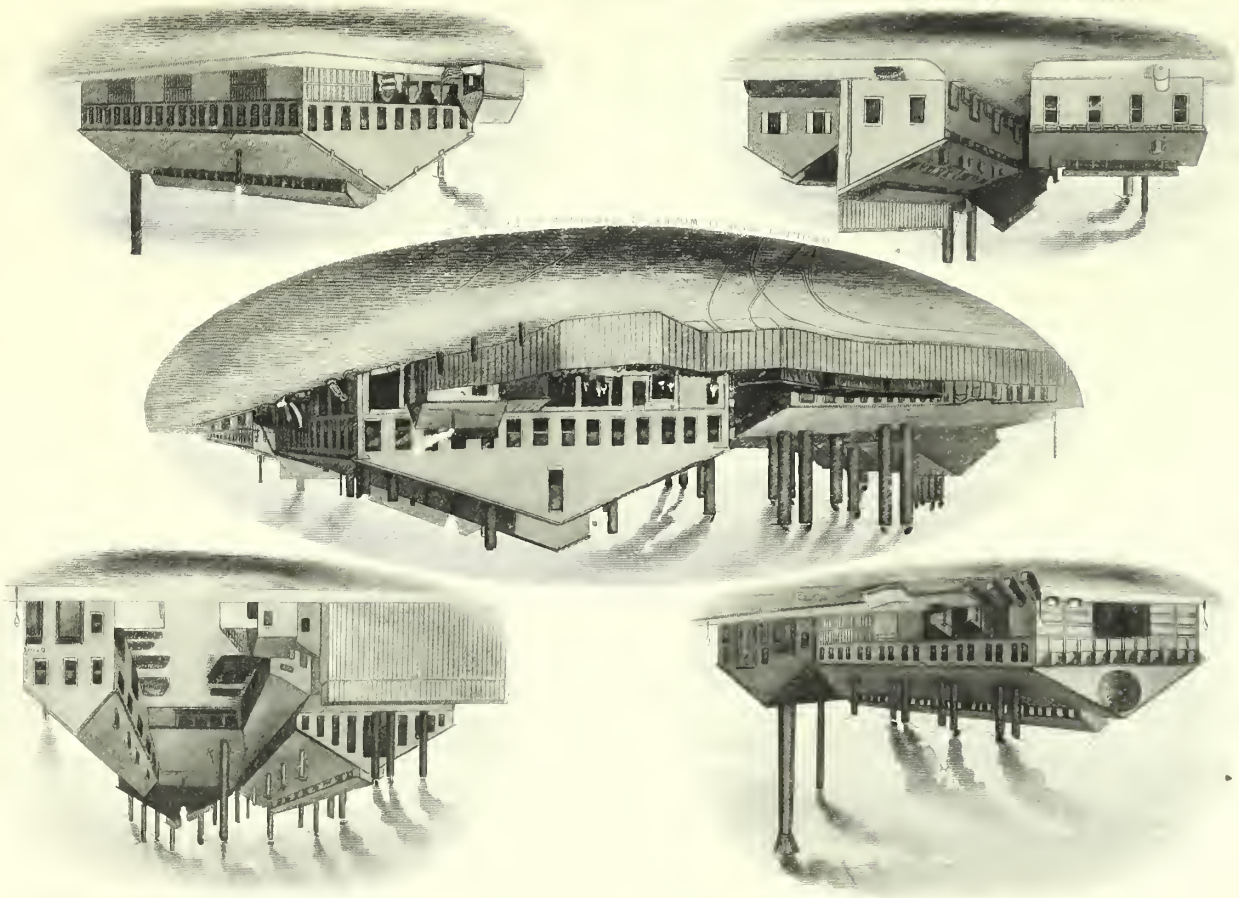
C. W. ANSHUTZ is the second son of Henry Anshutz, and was born in Louisville, Kentucky, July 6th, 1840. While yet a child he went to Pittsburgh, where he received a sound commercial education. After leaving college he entered his father's foundry as a moulder, making his way step by step to his position as foreman of the works.

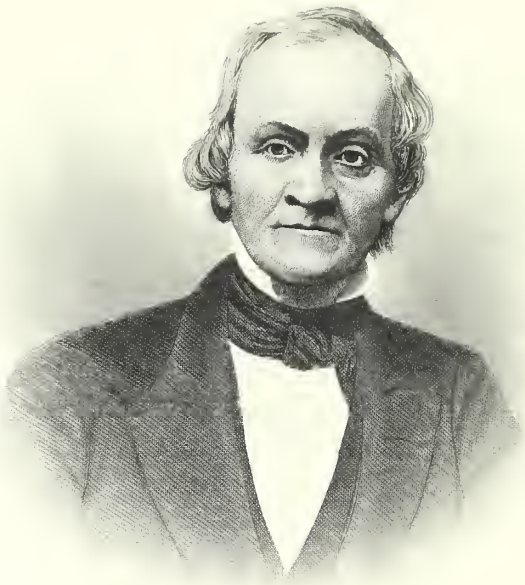
ISABELLA FURNACES, Pittsburgh, situated on the north bank of the Allegheny river, some five miles distant from the city, contiguous to the main line of the Western Pennsylvania Railway, are owned by a company. The organization comprises, among others, the well-known iron manufacturing firms of Graff, Bennett & Co., Spang, Chalfant & Co., Lewis Bailey, Dalzell & Co., the Olivers, of Lewis Oliver & Phillips, J. Painter & Sons, William Smith and Benjamin Crowther. It was formed in 1871, and during the same year commenced building operations, being fully prepared to expend whatever was necessary to make the enterprise not only a success but a triumph. John W. Chalfant was made the Financial Manager and Benjamin Crowther the Superintendent of Construction. In order to secure every possible improvement, the latter—although he had constructed several large furnaces west of the Alleghenies—made a tour of inspection through the United States and Great Britain, and from his observation and practical knowledge was enabled to erect the great works which have been so successfully operated. Without regard to primary expense, the economical production of metal was made the great consideration to be kept in view. There are two stacks; the smaller was "blowed in" in June, 1872, and the greater in the following November. All the necessary buildings and appointments are of the finest description; and the enterprise, in all its ramifications, required an expenditure of $900,000. The height of each stack is 75 feet; the boshes are 18 and 20 feet respectively. The capacity of the smaller stack is 10,928 cubic feet, and that of the larger is 12,914 cubic feet. The aggregate maximum production was estimated at 1350 tons per week. For the week ending October 24th, 1874, the yield of the smaller furnace is stated as $651\frac{0}{2}\frac{3}{4}\frac{0}{0}$ tons, which is said to be the greatest production ever attained by any furnace of its size in the world. But even these figures have been surpassed; for the report of the superintendent for the week ending November 7th, 1874, gives the enormous amount of $702\frac{1}{2}\frac{2}{2}\frac{2}{4}\frac{0}{0}$ tons. The ore used are the finest grades of Champlain and Superior. Each stack is enclosed in a casing of plate iron, reaching within 15 feet of the hearth, and resting upon an entablature supported by iron columns. A cast iron water-box surrounds the hearth, to prevent the destruction of the wall by heat; and the slag is run into cooling moulds on a circulating table sunk in the floor. The furnaces stand 64 feet apart; the throat of each is surrounded by a charging platform, and these are connected by an iron bridge. The hoisting of materials is accomplished by a pneumatic lift in the rear of each stack. The water supply is obtained from the Allegheny river, and is held in iron tanks elevated on pillars between the stacks. In the rear of the furnaces are situated the hot blast ovens, of which there are five for each furnace, although only four are used at a time, the remaining one being only in

operation in case of accident or repairs to any of the others. The gases from the furnaces are taken off by means of a horizontal flue near the top, and are thence conveyed downwards and used to heat the boilers. By this arrangement a saving of seventy-five tons of coal per week is effected; this economy in the manufacture of pig-iron has been entirely overlooked until recently. Immediately in the rear of the hot blast ovens, and on a level of 10 feet lower, is the stock house, a wooden building, 240 feet long, 75 feet wide and 32 feet high, covered with corrugated iron on the side next the furnaces and having a slate roof. It is traversed by an elevated railway, and provided with bins for the reception of coke, ore and flux. As the premises embrace thirty-four acres of ground, there is ample space to spare for stock outside. Directly in front of the stacks and facing the Allegheny river is a casting house, 79 feet long, 122 feet wide and 40 feet high. It is built entirely of stone and iron, and the roof is in two spans of 61 feet each, supported in the middle by a row of iron columns, by which the building is practically divided into two rooms. To the left of this building stands the engine house, 97 feet long, 40 feet wide and 40½ feet high, built of brick and covered with a slate roof. It contains six vertical direct acting engines, situated in a straight line, 14 feet apart from centre to centre, and working independently of each other. The blast cylinders, which work with puppet valves, have a diameter of 84 inches, and are directly over the engines, connected with the main line by branch-pipes. The engines have each a cylinder of 35 inches, and 4 feet stroke; the diameter of the fly-wheels is 14 feet; the maximum speed is 19 revolutions per minute, giving 5848 cubic feet of air. The use of several engines of small size, in preference to a single large one, has been found to be attended with many advantages; the expense is less and the machinery is lighter; the blast is uniform, requires no regulator, and is produced without noise, while in case of accident to one it does not become necessary to stop the furnace. But four of these engines are used at the same time, and great economy is effected by applying the exhausted steam to raise the temperature of the water before it goes to the boilers. The boiler house is a brick building, 85 feet long, 75 feet wide and 35 feet high, with a roof of iron and slate. It contains twelve boilers in batteries of four each. These are plain cylinders, 42 inches in diameter and 64 feet long. The chimney stack is of plate iron, 16½ feet in diameter and 112 feet high. The company manufactures its own coke, having 200 ovens in Westmoreland county, where it owns 900 acres of coal territory, situated on the line of railway that passes the furnaces. The rolling stock consists of 66 flat cars, 53 coke cars and 2 locomotive engines. Connected with the furnaces are a car-repair shop, measuring 105 feet by 32 feet, and a blacksmith shop, 32 feet by 40 feet. There is also on the premises a chemical laboratory for the analysis of material. Conducted in the most liberal spirit, the expenditure in connection with the enterprise has necessarily been very great. Nothing that experience could suggest or money obtain was omitted. Recording, as they do, the greatest production of pig-metal ever effected in the world up to the year 1874, these furnaces hold a prominent position in the pig-iron trade of the United States. At the present writing the company is preparing to erect another stack and make further improvements, involving an outlay of $100,000.

BENJAMIN CROWTHER, Superintendent of the Isabella Furnaces, was born in Staffordshire, England, September 29th, 1826, where also he was educated. He emigrated to the United States in 1844, with his father's family, and settled in Morgantown, West Virginia, where a furnace property was purchased. After remaining there two years, his father, brothers and himself removed to Brady's Bend, Pennsylvania, where they erected the furnaces for the Brady's Bend Iron Works. In 1848, his father went to Lowell, Ohio, where he "blowed in" the Lowell Furnace, the first furnace in the United States to use the raw bituminous coal, and in the same year Benjamin Crowther took charge of this furnace and remained there ten years. In 1861, he went to Pittsburgh and erected two furnaces at Manchester, in which he owned an interest. At this point he continued until 1871, when he took charge of the construction of the Isabella Furnace. He was married, in 1846, to Mary Jane Hill, of Staffordshire, England.

HUSSEY, WELLS & CO., Manufacturers of Cast Steel, Pittsburgh. This firm was originally organized in 1858, by C. G. Hussey, Thomas M. Howe, Calvin Wells and James M. Cooper, and commenced operations in April, 1859, on premises at the corner of Penn avenue and Seventeenth street, covering a space of 200 by 250 feet. Now the works are spread over an area of four acres, embracing nearly all the ground between Sixteenth and Eighteenth streets, Penn avenue and Alle-





C. G. Hennessy

gheny Valley Railroad. They are the largest of their kind in the United States, and in them was first demonstrated the capacity of American iron for making a first-class quality of tool steel. Many attempts, which reflect credit on the enterprise and patriotism of the projectors, had previously been made throughout the United States to render the country independent of British steel makers, but none had succeeded without the use of foreign iron, and not one had been fruitful of an article equal to the best brand of English steel, while many had resulted in the most lamentable failures and involved the projectors in ruin. With such a record in the East, it will readily be seen under what discouraging circumstances the enterprise started west of the Alleghenies. There was an early attempt to make steel on the ground occupied by the present firm, but it proved a failure, and the property, which then consisted of a smelting shop of twelve furnaces, was purchased by the original organization. After remodelling the works to suit themselves, the attempt was renewed. Many experiments preceded final success. Every description of American iron was tested. The English method of converting had been to roast long bars of iron in a brick oven between alternate layers of charcoal, then reduce to pieces and complete the operation in the crucible. They were the first to demonstrate that the conversion might be made in the crucible alone. Before success was attained, between three and four hundred thousand dollars were expended; but with what caution it was begun may be inferred from the fact that during the first three months only ten tons of steel were produced, and but 280 tons during the first fifteen months. The introduction into the market of their tool steel created a sensation, and their success was looked upon by some with incredulity; by others, whose interest lay in the maintenance of the British hold on the market, with apprehension, as competent judges thought they saw the dawning of a new and better era for the United States in this matter. The effect of their success was soon seen, for although they only made about a ton a day of tool steel, the prices of imported steel dropped very considerably during the first year. The business grew rapidly during the war, especially in tool steel and spring steel. They were also the first to make successful homogeneous steel plates for boilers, but abandoned the manufacture on account of inferior machinery. In 1865, however, they started a new plate mill, with all the improved machinery, and then the business proved a decided success. Since that date the steel plate has been a leading feature of their products. The growth of the establishment has been regular and gradual. The capacity of the works has been increased from time to time, until now the appointments of the shops comprise eight trains of rolls, eight engines supplied by twenty boilers, nine steam hammers, five tail hammers, 102 coke-melting furnaces and four twenty-four pot Sieman furnaces for melting by gas, equal to ninety-six coke furnaces, besides steam shears, hydraulic presses, etc. In 1863, they made about 1900 tons; in 1872, when the highest point was reached, they produced 6167 tons of finished steel, valued at $1,350,000. About 350 men are employed. For the best quality of steel the Champlain iron reduced by charcoal is used, but for the ordinary quality the common coke and charcoal irons of the vicinity prove completely satisfactory. The leading features of their production are tool and spring steel, steel for railway supplies, plates and steel for agricultural implements. Plates they have exported. The triumph of their enterprise, as well as the superiority of their steel as compared with that of British manufacture, is indicated in the statement of Mr. Ames, of the Chicopee Arms Manufacturing Company, of Massachusetts, who testified before a Congressional committee that his firm had used 200 tons of Hussey, Wells & Co.'s steel in the manufacture of sabres for the army with a loss by defective metal of less than 2 per cent., which was a much better result than they had ever attained in the use of English steel. In 1866, C. C. Hussey and C. A. Howe, sons of C. G. Hussey and Thomas M. Howe, were admitted into partnership. The firm has since lost two of its members by death, C. A. Howe and Colonel James M. Cooper.

CURTIS G. HUSSEY, M. D., was born at Sandy Springs, Maryland, August 11th, 1802. His parents were members of the Society of Friends, and at an early age the family removed to Jefferson county, Ohio, where he received a common school education, and afterwards studied medicine at Mount Pleasant. At the age of twenty-three he had his medical knowledge and a debt of $200, contracted for his tuition, with which to start in the world. Settling in Morgan county, Indiana, he at once began the practice of his profession, and with such energy and ability prosecuted the same that in four years he had acquired a capital of several thousand dollars. At this date speculation was the order of the day, and Dr. Hussey, in keeping with the spirit of the times, invested his surplus capital in a country mercantile establishment; and, still continuing the active pursuit of his profession, extended his commercial operations until, in a few

years, he was the proprietor of five establishments in as many villages in the vicinity of his home. With his various other enterprises he also engaged in the business of packing pork and provisions for the New Orleans market, and in the spring of 1837 he visited that city, where his health, long impaired by over application, failed him, and he was prostrated for several months, recovering only to find the country overwhelmed by the financial panic of that year and a portion of his own accumulations swept away. Recovering his health and returning to the North, in 1839 he engaged in the pork packing and provision business in Pittsburgh. When, in 1843, the Government acquired from the Chippewa Indians the title to the copper territory of Michigan, he, through an agent, leased, as he could not buy, a portion of these mineral lands. The following summer he visited the region in person and acquired a large interest in a valuable tract on Eagle river. Here the Pittsburgh & Boston Mining Company, of which Dr. Hussey was subsequently President, opened in 1845 the famous Cliff Mine. In 1850, in connection with the Hon. Thomas M. Howe, he erected the Pittsburgh Smelting Works, the business of which was afterwards extended to the manufacture of sheet copper and brass. In 1859, he became the principal of the firm of Hussey, Wells & Co., and to him personally is due the credit of first successfully converting steel in the crucible. At the age of seventy-two he is still actively engaged in giving personal attention to his very extensive business affairs.

CALVIN WELLS was born in Genesee county, State of New York, in 1827. His family being in reduced circumstances, at the age of twenty he gladly accepted an invitation from his brother, Rev. S. T. Wells, to remove to Pittsburgh, and at the university in that city he completed his education. He afterwards entered the employ of Benjamin Glyde, wholesale dry goods merchant, on Wood street, in the same city, and remained with him until engaged by Dr. C. G. Hussey, as clerk and book-keeper in the copper works of C. G. Hussey & Co. His connection with Dr. Hussey in various capacities continued until 1858, when he joined him in the experiment of starting the crucible steel works of Hussey, Wells & Co. In 1866, with Mr. French, he assumed the business of the Hazen Light Steel Spring Company, changing the name to that of the Pittsburgh Cast Steel Spring Works, which was subsequently changed to A. French & Co. His connection with both establishments has been active. Since the organization of the firm of Hussey, Wells & Co., he has been its business manager; he is half owner of the steel spring works, conducted under the name of A. French & Co., and has been a prominent member of the Western and National Steel Associations since their organization. For several years he has been a director in the Exchange National Bank, of Pittsburgh, and from the organization of the National Iron and Steel Publishing Company, which issues *The American Manufacturer and Iron World*, he has been President of the concern and largely influential in directing the general policy of the paper. In 1854, he was married to Anne, daughter of Benjamin Glyde, of Pittsburgh. In 1859 this lady died, and two years later he married Mary, the sister of his first wife. The industry and integrity which lead to success, such as Mr. Wells', is implied in the short history of his life. By the policy of honesty, from the most humble beginning, he has gained his present honorable position, earning the proud satisfaction that he has not only benefited himself, but has aided the general public and contributed much to add a great feature to the industries of the country.

JAMES PIERCE, Iron Master, of Sharpsville, was born in Swanzey, Cheshire county, New Hampshire, on September 24th, 1810, and remained with his father, whose name was also James, until he was of age, working on the farm and receiving such limited education as the country schools of that period furnished. He is descended from Thomas Pierce, who emigrated to this country from Northumberland county, England, about the year 1628, and settled in the Massachusetts Bay Colony, in the vicinity of Boston. At the age of twenty-one he left home and hired himself by the month to work at the lumber business, in which, after about two years, he embarked on his own account, devoting his attention to the manufacture of "shooks" for sugar hogsheads, and running them to market down the Connecticut river. He married at the age of twenty-seven, and in connection with his lumber business added the occupation of a farmer also. At these employments he continued for a few years; but possessing an enterprising spirit, and desiring a wider field for the display of his energies, he sold his property in New Hampshire, and in 1845 emigrated with his young family to Pennsylvania. After a short residence in Erie county, he removed to Mercer county, where he continued to reside until his death. The first enterprise in which he engaged here was

Calvin Wells.

James. Pierce.

mining and shipping coal. This was in the year 1847, in the infancy of the coal business of the Shenango Valley, which has since attained so much importance. This adventure was only moderately successful, the mine being limited and soon exhausted. He then opened new mines near to his present residence, at Mount Hickory, which proved to be very valuable, and where was laid the foundation of his subsequent eminently successful business career. To facilitate the transportation of the coal from these mines to the Pennsylvania & Erie Canal, a distance of about two miles, he constructed a tram-road operated by horse power, which was regarded then as a wonderful achievement of individual enterprise, and which answered a most valuable purpose until it was superseded by the completion of the Erie & Pittsburgh and the Sharpsville & Oakland Railroads. In the construction of both these roads he took a deep interest. In the former he was a large stockholder and a director; in the latter, the principal stockholder and the President and General Manager from the beginning to the present time. These roads have performed an indispensable part in the development of the iron, coal and other industries of the country through which they pass, and to the energy and public spirit of James Pierce, and other gentlemen associated with him, the community is indebted for their construction and the beneficial results experienced therefrom. The Sharpsville & Oakland Railroad is now being extended in the direction of the Butler county coal field, and will also be connected with the Great Western & Lake Shore road at Sharon, thereby furnishing an outlet to Cleveland and other lake ports west of Erie. These are important connections and will be urged to completion without delay. Among the first to engage in the coal business in Mercer county, he continued to be among the more prominent and successful operators of the present period, being connected with extensive mines both in Mercer and Lawrence counties. His connection with the manufacture of iron commenced in the year 1859. Becoming the purchaser of the Sharpsville Furnace, which had remained idle for several years, he put the same in operation during that year, and it has been in operation (with occasional stoppages for repairs) until the late depression in the iron business made it expedient to lessen the production of iron throughout the country. He, in connection with W. L. Scott, of Erie, erected the Mount Hickory Furnaces (two stacks) at Sharpsville, in 1868. More recently, in company with two of his sons (Jonas J. and Wallace) and George D. Kelly, he erected the Douglas Furnaces (two stacks); and another son (Walter) is a partner in two other furnaces erected by the Spearman Iron Company. Thus he was identified with seven of the nine furnaces at Sharpsville, Pennsylvania, all of which are first-class establishments. He had also large investments in coal lands in the State of Indiana, and in iron mines at Lake Superior, which are only partially developed. These embrace the mining, manufacturing and railroad enterprises with which he was connected, but they formed only a part of his extensive business operations. He was President and principal owner of the Iron Banking Company, of Sharpsville, and also a stockholder in the Sharon Banking Company. His farming operations were on a very extensive scale, and conducted with more science and system than is commonly practised. The home place, particularly, is a model farm; the dwelling and out-building are not surpassed by any of the kind in western Pennsylvania, the land being in a high state of cultivation and abounding in the various fruits adapted to the climate; in short, it combines all the advantages and comforts necessary to make it a most desirable residence. He also owned a large and valuable herd of thorough-bred cattle. They are equal to any in the State and were awarded numerous first-class premiums during the recent season at the Northwestern Pennsylvania Fair, as well as elsewhere. At the time of his death he had just completed a palatial residence in the borough of Sharpsville, which, for architectural design, beauty of finish and convenience of arrangement, will compare favorably with the best city or suburban residences to be found anywhere. His life was not only a very active and successful one, but also highly serviceable to the community in which his extensive operations were conducted. Notwithstanding the heavy claims of business upon his time and attention, he was not unmindful of his duties as a citizen, but was always ready to cooperate with hand and purse in every enterprise to benefit and improve society; was noted, in fact, for his public spirit and liberality. He was a devoted friend to the cause of education, took a deep interest in the common schools, served as a director for a number of years, and further manifested his sympathy by large contributions of ground and in the erection of school houses in the township in which he lived, of which the fine school building in Sharpsville is but a single instance. A noted illustration of his liberality and public spirit was a recent contribution of $10,000, in the name of his wife, towards endowing a Female Professorship, to be called the "Chloe Pierce Professorship," in Bechtel College, a new and prosperous institution

of learning located at Akron, Ohio, of which he was one of the trustees. The successful management of these numerous operations was only possible to a man of exceptional mental and physical abilities. He died on December 2d, 1874, from the effects of an accident, sustained a week before.

SAMUEL SEVERANCE'S Manufactory of Spikes and Rivets for Boilers, Tanks, etc., Pittsburgh. This establishment was founded by Levi Severance, father of the present proprietor, in the year 1832, and the works were then located in the Fifth Ward of the city of Pittsburgh, and devoted to the same purposes as now. Levi Severance was the inventor of the first spike and rivet-making machine in this section of the country, having perfected and patented it. The prejudice against machine-made spikes, which at that time existed, rapidly gave way before the introduction of this novel and useful invention, and it soon won for itself the notoriety the inventor designed it should. At first there was but one machine started, which was operated by Levi Severance himself; but he was soon induced to build others, such was the demand for the spikes. In 1840, the works were removed to the present site, and continued in the occupancy of the projector until his death, in 1854, when the business, which was then in a very flourishing condition, passed into the hands of his son, Samuel, the present proprietor. In 1861, the works were entirely destroyed by fire, and were subsequently rebuilt in a much better style and with more extended facilities. The works at present contain ten rivet-making machines and employ thirty men. The premises measure 50 feet on First avenue, running through to Water street 160 feet, and are two stories in height. The capacity of the works is ten tons of rivets and spikes per day; and these are of the very best manufacture, as is shown by the fact that in all boiler explosions the rivets made at this establishment have stood intact, while the iron plates have given way. These productions are known all over the West, and a large order has recently been filled for and shipped to a Spanish house.

LEVI SEVERANCE, the founder of the business, was born in Vermont, in 1792. He received a very good education in his native town, the best that could be afforded in those days. In early life he learned the trade of a blacksmith, and also that of a nail-maker. In 1825, he went to Pittsburgh, crossing the mountains in a wagon. There he settled, and invented the machine with which he started in business for himself. During an epidemic of Asiatic cholera, in 1854, he was attacked, and the disease terminated fatally.

SAMUEL SEVERANCE, present proprietor, and son of the above, was born in Pittsburgh, in 1831. When but eight years of age he began to work in his father's establishment, where he soon learned all the practical details of the business so necessary to a successful prosecution of the same; and when called upon to assume the management of the business, he was perfectly fitted for the task. From the hour he commenced work he gave his whole time to the employment, and never went to a day school, but availed himself of the advantages of evening instruction. He has been repeatedly tendered offices of trust in the city, but has never accepted any, preferring to devote all his time to his business, so as to develop one of the most important industries in the country, as is most unquestionably the manufacture of a good rivet, upon which so much in the security of life and property constantly depends. He is now a director of the Penn Bank, of Pittsburgh.

ERIE BOOT AND SHOE COMPANY, Erie, J. Eichenlaub, President; J. W. Ryan, Treasurer. This enterprise was established in 1871, the company being regularly incorporated. The factory is located on the corner of Ash and Twenty-fifth streets, and the premises are one acre in extent. The building is of brick, measuring 120 feet in length and 34 feet in width, and four stories high. It contains all the latest improvements in leather-working and shoemaking machinery. Fuel is obtained from a natural gas well on the premises. The manufactures amount to 50,000 pairs of boots and shoes yearly, valued at $200,000, and 110 hands are constantly employed. The principal market for the goods is found in the States of Pennsylvania, Ohio, Indiana and Michigan. The company has been very successful, and its make of shoes is highly appreciated. The business is under the personal supervision of the President, who has had a life-long experience in all matters connected with the trade; and to his intimate knowledge of every phase of the business and its requirements the establishment owes its present prosperity and success.

JOSEPH EICHENLAUB, President and Manager of the company, was born in Herxheim, Bavaria, January 4th, 1833, where also he was educated. He accompanied his parents, who emigrated to the United States in 1845, and located in Cincinnati, Ohio, where he was apprenticed to the boot and shoe business. In 1847, he went to Erie, Pennsylvania, where he worked as a journeyman for six years, and subsequently engaged in business on his own account, having his workshop on State street, between Park and Seventh streets, which he conducted with success until 1871, when, in conjunction with others, he established the factory with which he is now connected. He is also largely engaged in real estate operations, having in 1869 purchased what was known as the "Beecher Garden," which he had surveyed and divided into city lots, now termed "Eichenlaub's Division," and upon which some of the finest buildings in the city have been erected. He is the Vice-President and a director of the German Savings Institution; as also a director and Secretary of the German Insurance Company. In addition to these prominent positions he has served as a member of the City Councils for seven years. He was married, in 1853, to Mary E. Anthony, of Erie, and at present his city residence is on Ninth street.

J. D. BRYSON, inventor, was born in Butler county, Pennsylvania, in 1818, and during his boyhood days learned the trade of a millwright. In 1837, he became a member of the firm of McNair & Bryson, millwrights and builders, which co-partnership lasted until 1848, when he withdrew from the same. In 1849, he went to New Castle, Pennsylvania, and followed the occupation of a mill builder until 1868, when he became interested in the firm of Cunningham & Co., with whom he is still connected. In 1868, he invented and patented the "Bryson Turret Case Turbine Water-wheel," of which the company have manufactured a large number, and which have proved very successful. Some years since he filled the post of Superintendent of the Ocean Oil Company, near Petroleum Centre, Pennsylvania, during which time he demonstrated the practicability of using casing in oil wells, and procured a patent, which, however, was antedated by another not covering the same grounds: the latter was of no real utility and had never been practically applied. The Bryson casing was first used in July, 1865, in a well belonging to Dunlap & Duncan, on Boyd farm, Venango county, Pennsylvania. It proved a perfect success, and to him as the inventor should be awarded the highest meed; for it is not too much to assert that by the use of this appliance millions have been added to the wealth of the country, beside opening a new branch of industry which has given employment to thousands.

BAY STATE IRON WORKS, Erie, Noble & Hall, Proprietors. This establishment dates from 1864, and was founded by L. Thompson & Co., who conducted it for one year. In 1865, L. H. Hall having purchased one-fourth interest, the firm took the style of L. Thompson, Hall & Co., by whom the works were operated until 1868, when, by the retirement of the other members, the firm assumed the title of Noble & Hall, from the present owners. The works are situated at the corner of Third and Peach streets, and the premises are 165 feet square, mostly occupied by the buildings, embracing a foundry, boiler shop and machine shop, built of brick and two stories high. These are filled with the most approved machinery, including two steam engines of forty horse power each, ten lathes, four drill presses and two planers. The proprietors carry on the manufacture of marine, stationary, portable and hoisting engines; the latter are principally used in unloading vessels and for excavating canals, etc. The capacity of the engines so built ranges from 10 to 150 horse power; boilers also of a corresponding grade are made at this establishment. The firm also manufactures all sizes of circular, gang and muly saw mills. A large foundry business is also carried on, from which are furnished all the castings required by the shops of the Pittsburgh & Erie Railroad Company, located in Erie. The firm recently commenced to manufacture an improved automatic cut-off engine, for use in flouring mills, factories, etc., where economy in fuel is an object. A large business has been done in engines of eight, ten and twelve horse power, for use in the oil regions. The operations of the firm have averaged about $200,000 per annum, and it employs about eighty hands. About two-thirds of the entire trade is confined to a radius of fifty miles, the balance going West. In 1873, the capacity of the works was increased about one-third; but owing to the general depression of business, which succeeded the financial revulsion of September in that year, the full capacity of the establishment has not been attained. It is, however, one of the largest in western Pennsylvania,

as well as the best conducted and remunerative, and is under the personal supervision of L. H. Hall.

L. H. HALL was born in Randolph, Crawford county, Pennsylvania, October 31st, 1828, of American parentage, his father, Leonard Hall, being a farmer in that section. He was educated in his native place, and when seventeen years old became a teacher, being so occupied during the winter months, and pursuing the vocation of a farmer in summer. For six years he was thus occupied, and then engaged in the manufacture and sale of chain and other pumps, at the same time conducting his farm. He was so engaged until he embarked in the oil business, about 1860, in which he met with fair success, being a part owner of the famous Noble & Delamater well. He continued in this enterprise about five years, when he disposed of his interests and removed to Erie, Pennsylvania, where he purchased a fourth share of the Bay State Iron Works, and is at present a half owner and Manager. He is also a stockholder in the Keystone National Bank, of Erie. He was married, in 1855, to Eliza A. Reed, of Randolph, and has a family of three children.

J. L. CARVER'S PLANING MILL, Sharon, is located at the corner of Dock street and Wheatland road, in that borough. The buildings were erected in 1860, by Sebastian Runser and C. G. Carver, father of the present owner, and were used as a carriage factory until 1866, when they were changed to their present use by S. Runser, J. L. Carver and N. C. Trout. The senior partner, S. Runser, withdrew from the business in 1868, and N. C. Trout in 1874, leaving J. L. Carver sole owner and proprietor. The main building is 120 feet front and 55 feet deep, with two wings, each running back 65 feet, thus presenting the three sides of the building with a frontage of 120 feet and two stories high. The machinery contained therein includes three planers —one of these a Putnam planer and matcher—two tenders, two moulding machines, two power mortises, one shaper and a full set of sash, door and blind machinery. The whole of these are driven by a steam engine of forty horse power. The articles manufactured consist of doors, sashes, blinds, sidings, floorings, etc., and the amount of lumber consumed in their production is about three quarters of a million feet annually. There are about twenty-five hands employed, on an average, all the year round. The mill is at the present time in excellent condition and is doing a first-class business.

J. L. CARVER, the present proprietor, was born in Sharon, September 1st, 1834, of American parentage, his father, C. G. Carver, being a native of Herkimer county, New York. He was educated at the Western Reserve Institute, in Ohio, and after leaving school, in 1860, embarked in the oil business, which he prosecuted for three years with fair success. He next became engaged in the wholesale grocery trade, at Erie, Pennsylvania, and at the expiration of two years disposed of the same and went abroad. After a year's sojourn on the Continent of Europe, he returned to the United States, in 1866, and engaged in his present business.

OLD DUQUESNE TANNERY, Pittsburgh, James Callery & Co. In 1812, this tannery was established by William Hays, a citizen of Allegheny county, who was also a legislator and judge. The present site of its warehouse and office, No. 102 Liberty street, is the location first occupied by Mr. Hays. He continued the business until his death, in 1846, and was succeeded by his eldest son, Richard Hays, who ten years later disposed of his interest therein to his younger brother, Charles Hays, and Henry Stewart. The firm of Hays & Stewart successfully conducted the business until 1870, when James Callery & Co. purchased the entire establishment, and have continued its operation with uninterrupted prosperity to the present time. Their business is very extensive, about 19,000 sides being tanned annually. Harness, belting and sole leather are their products. The tannery is the oldest in the western part of the State, and the many years of its successful operation and the excellence of its goods have made it so well known that its trade is confined to no one section of the country, but extends from Maine to Texas and from the great Northwest to California. The estimated value of the annual produce is over $175,000.

JAMES CALLERY was born in the town of Boyle, county Roscommon, Ireland, in 1833. He arrived in the United States when sixteen years of age, and apprenticed himself to the trade of tanner and currier in a large establishment in Newark, New Jersey. Such diligence and honesty did he display in his labor that in the third year of his service he received a present from his employers of $50. Carefully investing this sum it became the nucleus of his fortune. Upon attaining his majority he worked for about two years as journeyman in one of the Eastern States, and removed to

Pittsburgh in 1854, his capital then being $100. For the two years following he was employed in several tanneries, and by economy had increased his capital to $500. The panic of 1857 deprived him of work, and it was then he made the seemingly rash resolve to enter into business for himself. He located at Bakerstown, a few miles from Pittsburgh, and met with great success. Removing, in 1860, to Allegheny City, he purchased the Old Duquesne Tannery, of John Taggart. In 1870, he was burnt out, but, undismayed, he purchased the establishment of Hays & Stewart for $45,000, and resumed business. In the twenty years of his business life he has never received a check from any of the financial panics which have prevailed. Before its consolidation, he was Burgess of Old Duquesne Borough, Allegheny county, for two years. He was for two successive terms a member of the Allegheny City Select Councils, and resigned therefrom in 1870. In politics a Democrat, he was always elected to office by the citizens of both parties. He is a director in the City National Bank, of Pittsburgh, and a stockholder in various other banks and institutions. In religious faith he is a Catholic, being a member of St. Peter's congregation, Allegheny City; he takes an active interest in the affairs of the church, and for a number of years has served as a member of its financial committee.

PITTSBURGH SAFE AND LOCK COMPANY (Limited), Pittsburgh. This company, whose manufactory is located at No. 167 Penn avenue, was organized in 1871, by Peter Rieseck and the brothers William and Michael Graves. The partners purchased their first patent from Martin Briggs, a safe manufacturer of Rochester, New York; three other patents, which enter into the construction of their safes, are the inventions of Peter Rieseck, who has also introduced many other improvements calculated to add to the efficiency of their work. Though they manufacture every variety of safe, they make a specialty of burglar-proof or "vault-work" for banks. During the first year of their operations they manufactured about 175 safes, much of the work being of the vault class, for business houses rebuilding after the great fire in Chicago. When in full operation, over 100 skilled mechanics are employed in the factory. In 1874, about 300 safes were turned out, varying in price from $100 to $6000. This company uses the three-flange doors, with the addition of grooves to each flange, which, upon closing, fit into the corresponding grooves or channels in the interior. In case of fire, the expansion of these grooves renders the safe perfectly air-tight. By an invention of Peter Rieseck, the side of the door upon which the hinges are placed is rendered as secure as those bearing the lock. The sides and top of the safe are not separate, but consist of one continuous piece of iron, lapped over, which they claim gives greater security. Constant tests are made, during every stage of the work, of its durability and perfectness. The average thickness of the fire-walls is 7 inches, from 20 to 33 per cent. greater than any other safe manufactured in the United States. The best twisted steel only is used for bolts, and the greatest care is taken in the fitting of the parts, every detail being conducted under the personal supervision of Peter Rieseck. A removal of the works to a more eligible location is in contemplation, in order to meet the growing demand for the safes of the company's manufacture. New improvements are also being constantly introduced, especially in the locks.

PETER RIESECK was born in Pittsburgh, of German parentage, in 1842. He was apprenticed to the printing trade, and while learning this he attended night school and also studied book-keeping and mechanical drawing. Not liking his trade, he engaged in other pursuits, and was for some years in the employ of his brothers, who are also safe manufacturers. Here he conceived the idea of organizing the Pittsburgh Safe Company, and to his skill, management and mechanical ingenuity is its success more particularly due.

THE BROTHERS GRAVES are sheet-iron workers by trade, but have turned their attention to and invested their capital in the safe manufacturing business, and they are now enjoying the fruits of their enterprise.

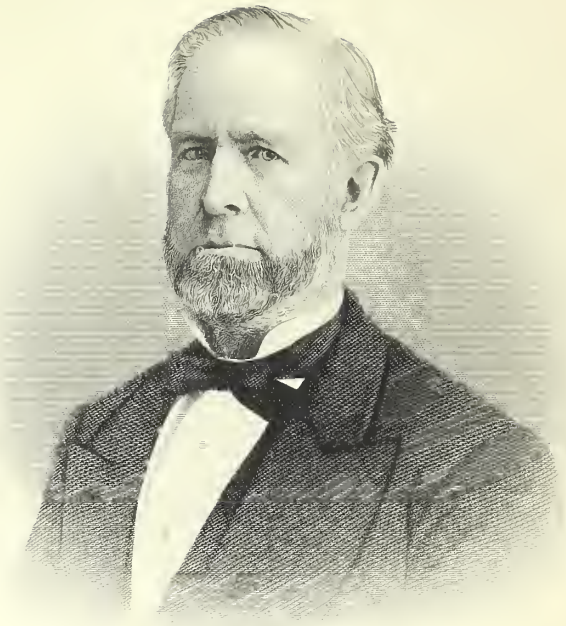
THE HAT MANUFACTORY OF JOSEPH FAREIRA, Philadelphia, was founded in the year 1823, by his father, John Fareira, and his first location was in the cellar adjoining an ordinary dwelling house, near Front and Spruce streets, the lot running through to Water street, the total extent of the premises being but 18 feet front and some 40 feet deep. Here the operations incident to the manufacture of hats were carried on by the proprietor, assisted by four workmen. It was but a small beginning, but in those days it was, notwithstanding, the first independent manufactory in the city,

and the articles produced were made in the rough state, disposed of and afterwards finished by the purchasers in the retail stores. In 1832, the business passed into the hands of the present proprietor, and at a subsequent date the factory on Lombard street was erected. This building, which is four stories high, is in dimensions 36 feet wide and 72 feet deep, where eighty hands are constantly employed in the manufacture of brush and felt hats. The whole process at the present day is far different from that practised a half century ago. The fur, as imported, is by no means fit for use, being filled with objectionable foreign bodies. These must first be removed by means of the picker, and then a most ingenious machine, the invention of a New York gentleman, is brought into requisition. It is known as the "Burr patent," and consists mainly of a cone, with a parabolic top made of brass, which revolves slowly; the material from which the hat is to be made is first weighed, so that the proper quantity is obtained, and it is then placed in a part of the machine which tears it into shreds. These particles of felt are projected against the revolving cone in a perfect stream, and the cone being perforated with a great number of small holes, the air is withdrawn from the inside, creating a partial vacuum and causing the felt to adhere to the sides. When the cone is completely covered, the machine is stopped and the incipient hat transferred to a bath, which cements the particles together, after which it is kneaded and pressed until the operator is satisfied that it is pliant enough. The next operation is the blocking, which gives the heretofore nameless shape a form of crown and brim. The fur, however, still retains its neutral tint, which is changed by the dyer, and subsequently the uneven and fuzzy appearance of the body is removed by the pouncer, and the hat is ready for the finisher. The introduction of these machines, and the impetus given thereby to the manufacture, involved a change of location for the finishing department to the extensive establishment, No. 25 North Fourth street, where both the stiff or soft hat bodies are handed over to experienced men and women. By the aid of numerous sewing machines women stitch the linings, previously prepared for the hats. There is the band of leather which encircles the lower portion of the hat; next the crown and top require lining, and none but the most experienced operatives can cut and adjust these. The better quality of soft hats have a binding around the edge of the brim, and this is affixed, together with the buckle, by a skilled female operative, and the article is ready for the market. The stiff hat, however, passes through the "curler's" hands, who shapes the curves, including the rim, and after ribboning it likewise is declared finished. All the boilers in the factory and dye house are heated by steam, which is a vast improvement over the old method. The value of goods produced has steadily increased, and at the present date reaches $100,000 per annum. The store is on the first floor of the finishing establishment, at No. 25 North Fourth street.

JOSEPH FAREIRA was born in Philadelphia, January 27th, 1811, and is a son of John Fareira. He received but a limited education in the public schools, and when only twelve years old became a laborer on a farm, where he remained for four years. At sixteen years of age he was apprenticed to learn hat making, and during the five years of his indentureship thoroughly mastered all the details of the business. When he attained his majority he found himself possessed of $300, which amount he had gathered from the earnings of overwork while an apprentice. Throughout his whole career of over a half century he has been successful, notwithstanding the many vicissitudes which from time to time assailed the business world. He is a Democrat of the old school, having deposited his maiden vote, in 1832, for General Andrew Jackson. Of late years he has been much interested in the organization and successful operation of passenger railways, and is a stockholder to a considerable extent in these corporations. He has raised a family of seven sons, four of whom were brought up to the hatting business.

NORRIS IRON COMPANY, Norristown, T. T. Woodruff, Proprietor.—This establishment was commenced in the spring of 1870, when the present owner purchased a half interest in the West Engine Company and organized the existing concern. In the following spring, he bought the remaining half, and has since been sole owner of the works. They are conveniently situated at Norristown, in connection with the Philadelphia & Reading and North Pennsylvania Railroads and contiguous to the Schuylkill river. They comprise a foundry, having a daily casting capacity of fifteen to twenty tons, machine, boiler, smith, and woodwork shops, and are calculated to employ 150 hands. They are also amply provided with branch tracks and appliances, for handling heavy freight, etc. Originally built in 1850, for the manufacture of hollow-ware, etc., they have been repeatedly enlarged, and are

NORRIS IRON COMPANY · NORRIS IRON CO.



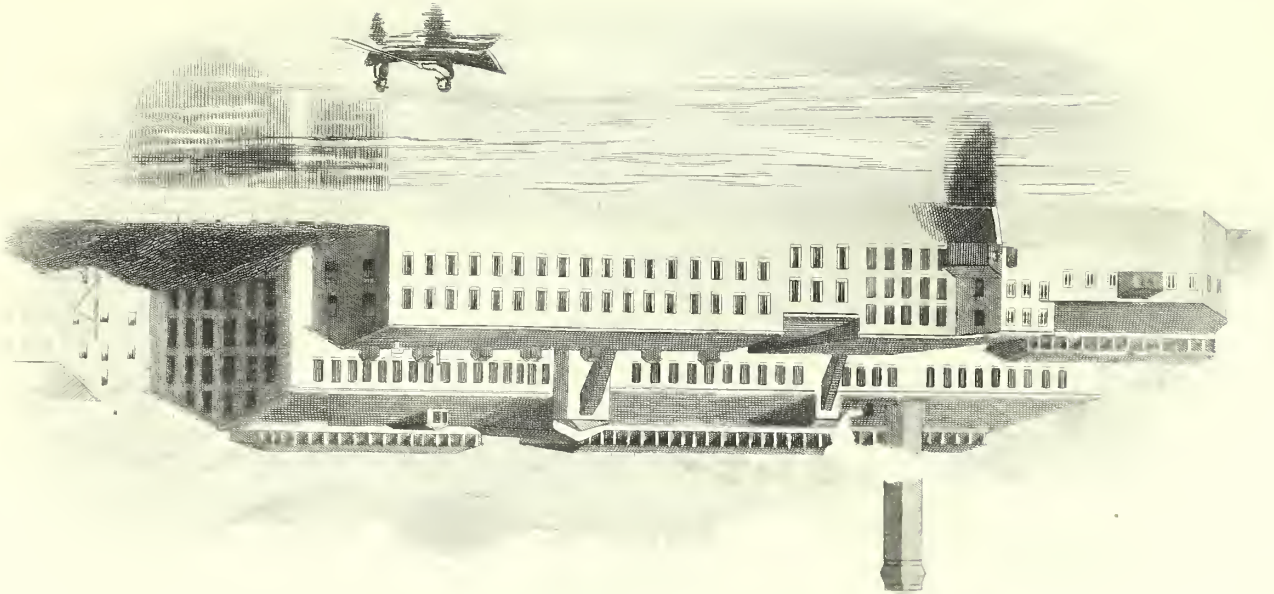
S. S. Woodruff

now fitted for the general foundry business. The West patent Steam Engine was devised and built at these works, prior to their transfer to the present company. Among those since manufactured may be mentioned the beam and ball Cornish pumping engines, the vertical blowing engine, 40 inch cylinder, with 9 feet stroke, and 66, 69.6 pounds pressure of blast, many high and low pressure engines and blowing engines, also, rolling mills, blast furnaces, mining machinery, stone crushers, sugar-mills, and boilers of all descriptions. The works enjoy a reputation commensurate with their capacity and intelligent management, and have been patronized by miners and manufacturers in every part of the Union and territories, as well as in Canada, Cuba, Mexico, South America, and Liberia. The latter country is especially indebted to the remarkable inventive talent of the proprietor, for two machines, manufactured at these works, which are probably destined to revolutionize its trade in two of its staple productions—coffee and indigo. The Coffee Huller is designed to remove the hull from the berry, without the slightest injury to its quality or aroma. This duty it performs perfectly, and with the utmost rapidity, with much more satisfactory results than those obtained by the old method of pulping and fermenting, whereby a considerable portion of the strength and fragrance of the berry was lost. The other invention, alluded to, is the Indigo Machine, which, from a given quantity of the raw material, produces twice the quantity of indigo, of a superior quality, as it is entirely free from mildew, and in one-tenth of the time required by the old process, at the same time enabling it to be packed in one-quarter the space formerly needed. Furthermore, the new plan, by oxydizing the water in the vats, relieves the hands employed from a vast amount of labor, both injurious and severe, which was previously indispensable. The utility of these inventions was suggested by Edward S. Morris, for many years deeply interested in Liberian affairs; but the conception and perfection of the machines is due to the proprietor of the works. These valuable devices are protected by five letters patent, granted by the United States and Liberia, to Messrs. Morris and Woodruff, and cannot well be imitated, either now or in the future.

T. T. WOODRUFF was born in Watertown, New York, April 8th, 1811. His father was from Connecticut and one of the first settlers in Jefferson county. The son received an education at the common schools, alternating with agricultural pursuits, till his fifteenth year, when he was apprenticed to D. & C. Colwell, carriage builders, Watertown, and creditably served his time. Feeling an inclination and aptitude for a mechanical occupation, he turned his attention to machinery, including such as pertained to cotton and woollen manufactures, railroad construction and equipments, etc. He early evinced a genius for invention, and many instances of his ingenuity in this respect might be cited, but his greatest effort, previously to occupying the Norris Works, was his invention of the sleeping car, for railroads, a description of which is unnecessary here. This was invented in 1853, and patented in 1856. One-quarter interest in the patent right was assigned, respectively, to George R. Dykeman, John S. Miller, and Orville W. Childs, and they, acting as the firm of T. T. Woodruff & Co., with the inventor as general agent, ordered the building of a sleeping car, containing all the improvements made up to that time, from T. W. Watson & Co., of Springfield, Massachusetts. This was completed, under the personal supervision of the inventor, in October, 1857; though, since that period, several other improvements have been made and patented, even as lately as 1869. These cars were introduced and placed upon many of the principal lines in the country, by special contract, and the company continued the business for some time; but it was finally merged into the Central Transportation Company, of which he was president, till he sold out his interest, in 1864. He founded the first bank at Mansfield, Ohio, and was its president till the latter year, when he removed to Philadelphia, and has since resided there.

SEVILL SCHOFIELD, Manufacturer of Woollen Goods, was born in Lees, near Oldham, England, August 13th, 1832. His father and family came to the United States in 1845, landing in New York city, whence they proceeded direct to Manayunk, Pennsylvania. His father engaged in contracting to furnish the necessary labor to operate mills for other parties, who furnished machinery, materials, etc., and Sevill, in common with his four brothers and two sisters, contributed their labor, but received no wages. His father, Joseph Schofield, had associated in partnership with James Lees, in 1849, and operated in mills upon Mill creek, but in 1857 the partnership was dissolved and Sevill assumed the full charge of the business. Having purchased a team, he himself did all the hauling, beside superintending in-door matters. His industry and energy were noticed by the

proprietor of McFadden's Mill, who was on intimate terms with his father's family, and he one day proposed to Sevill to purchase his mill. The offer was at first declined, on account of his limited means; but on the proposal of the owner, William McFadden, to sell for $10,000, one-fifth to be paid in one year and the balance in ten years, he resolved that the opportunity was not to be lost, and at once accepted the terms. The title having been made out in his father's name, they removed forthwith to the new location, and having occupied one room, rented out the remainder, from which the revenue was sufficient to cover all their expenses. In 1857, six months after this purchase, his father died, leaving a will providing that the property should not be divided during the lifetime of his widow. He then carried on the business in his mother's name until 1859, increasing her wealth from $800 to $16,000. Though he had attained the age of twenty-eight years, he had never received any wages; but, having married, he arranged to engage in business on his own account, and, giving his mother the interest upon her $16,000, associated with his brother, Charles, as S. & C. Schofield, and commenced operations. The building located at Lock No. 2, on the Schuylkill Navigation Company's canal, was 40 by 60 feet, five stories in height, and in it were the two sets of old machinery left by their father. The two brothers worked in every department of the mill, and though they employed but six hands their progress was so great during the first year that they were enabled to purchase for cash an entire outfit of new machinery, costing $4000. During the second year they doubled their capacity, and found it necessary to secure additional room by the purchase of the stock and machinery of their tenants, who were engaged in manufacturing the same line of goods, and January 1st, 1861, found them the occupants of the whole building. Their business now throve apace, and in 1862 they commenced the manufacture of blankets for the United States Government. In order to provide accommodations for the business, which they doubled each consecutive year, they enlarged their building in the spring of 1863, and, having procured the necessary additional machinery, erected a powerful engine for its operation, and occupied the whole in October of that year. His brother deeming himself sufficiently opulent, and fearing the result of the war, now retired, selling his interest for $40,000 to Sevill, who has since been the sole proprietor. The year 1864 witnessed no diminution, the income being doubled as usual, and between $80,000 and $90,000 being paid to the Government for taxes. His business continued to augment in a two-fold ratio in 1865, and having purchased adjoining properties he commenced the erection of another five-storied building, 70 by 120 feet; this, being finished in 1866, was filled with the finest imported machinery, and everything was in readiness for operation when it with its contents, valued at $225,000, was entirely destroyed by fire, March 26th, 1867. The building had been insured for about $80,000, but, as he was temporarily using his engine room for drying purposes while his new dry house was being erected, the insurance companies demanded heavy additional premiums; though demurring to their exorbitant rates, he had resolved that on the following day he would renew his policies, the last of which was cancelled on the very day of the fire; the risk ended at 12 M., and before midnight the whole was a heap of smouldering ruins. Thus the delay of a single day, though induced by peculiar and seemingly justifiable circumstances, involved a total loss of the value of that splendid building with all its costly contents. But he was not to be deterred or overwhelmed by this ill-timed disaster, and with his characteristic promptness and energy sailed without delay for Europe, to procure new machinery. Returning in June, he commenced the erection of a fire-proof building, 270 feet in length. Until it was completed, in 1868, he operated as best he could under the circumstances, having his spinning done by other parties and still running the original mill. The business has gone on in its prosperous career, and the beginning of 1874 found him occupying a three and a-half story building, 420 by 70 feet, a two story structure, 367 by 30 feet, and a four story L-shaped edifice, 130 by 33 feet, with the arm of the L about 90 by 33 feet. The whole flooring covers 171,840 square feet, or more than four acres of ground. He employs from 500 to 600 hands, consumes annually about 4,368,000 pounds of raw material, and has an investment of several hundred thousand dollars. His success is due as well to the uniformly excellent quality of his yarns, chinchillas, elysians, raze coatings and blankets as to his thorough knowledge of all the practical details of his business and energetic management. Before the war he manufactured largely for the Southern market, and this trade, which was wholly suspended during the Rebellion, is now gradually returning. When the rebels threatened Pennsylvania, in 1862 and 1863, moved by the common impulse of patriotism, the proprietors of these mills raised a company of men among their own operatives, continuing their wages during their absence, and sent it out under the command of Charles Schofield, while Sevill assumed the double



burden at home. Such is the history of a self-made man; one who, without any capital save his own industry and energy, has climbed to the top of the ladder of fortune. Here are presented the results of untiring industry, indomitable energy and perseverance, with the inherent recuperative force enabling him to surmount every obstacle and triumph over disasters which would unsettle the spirits of many. His example is a high incentive to ambition, energy and enterprise.

PITTSBURGH PLOW WORKS, John C. Bidwell, Proprietor, are located at the junction of Duquesne way, Fayette street and Garrison alley, Pittsburgh. They were established in 1859, by the present sole proprietor. Starting with only about half the present premises, the necessities of the ever-increasing trade of the works compelled their enlargement, and in 1862 adjoining properties were purchased and the buildings extended until they now have a frontage of 240 feet on Duquesne way, along the Allegheny river, and are bounded on three sides by public thoroughfares. The principal building, which was destroyed by fire in 1862 and rebuilt much larger, is 60 by 120 feet, and five stories high; besides this there is a moulding room, blacksmith and machine shop, one story high, and 120 by 160 feet; also a two story structure, 120 feet square, used for storing stock and seasoning and preparing the oak timber used in the various agricultural implements here manufactured; altogether there is under cover a floor surface equal to two acres of ground. Under the methodical management of the proprietor the enterprise has been most successful from the beginning. In connection with numerous other implements, not less than 200 plows of different patterns and sizes are manufactured at these works; many of these are for the West India, Mexican and South American markets, each country requiring plows especially adapted to the different crops raised, the mode of cultivation and the nature of the soil. On the breaking out of the civil war, Mr. Bidwell engaged in the manufacture of gun carriages, ammunition wagons and shells for the Government, and thus employed his works until the close of the Rebellion, when he resumed his former peaceful occupation. Most of the implements here produced are constructed under patents owned or controlled by the proprietor. He has the monopoly of a recent patent, of great value, for making cast steel plow mould-boards and shares, and also steel castings of any required pattern. The business has been sensibly affected by the Cuban War, and the amount of annual production is not as great as in former years. The maximum value has been upwards of $200,000 per year. Few establishments are managed with more system, economy and at the same time greater enterprise than these works, and spite of all drawbacks they take their place in the front rank among the great industries of the State.

JOHN C. BIDWELL was born at Hartford, Connecticut, August 9th, 1818, and removed with his parents to Pittsburgh in 1828. He there received a common school education, and in 1839 entered into the wholesale grocery and commission business, in which trade he continued until 1852. In 1859, he engaged in the manufacture of plows, and established the works of which he is still proprietor. In extending his business, and in order to more fully understand the requirements of the localities in which his trade was directed, he has made a number of trips to the West Indies. In 1842, he married the daughter of William Dilworth, of Pittsburgh; they have had five children, four of whom are now living. He has been the architect of his own fortune.

FAIRLAMB & ROBINSON, Manufacturers of Bricks, Chester. Amos Davis and Charles Fairlamb associated in partnership under the firm-name of Davis & Fairlamb on January 1st, 1868, and established a brick manufactory at the present location on the Philadelphia, Wilmington & Baltimore Railroad, about two miles south of the city of Chester. This firm employed some twenty-five hands, and produced some 800,000 bricks per annum; they continued their operations for some eighteen months, when Charles Fairlamb, having purchased his partner's interest, became the sole proprietor. He steadily increased the productive capacity of the works, and in 1873 employed about thirty-five hands, at an expense of over $8000, and turned out about 1,500,000 bricks. Daniel Robinson became a partner January 1st, 1874, and the firm assumed the present style and enlarged their operations, employing over forty hands and turning out, in 1874, some 2,500,000 bricks. They manufacture every variety of hand-made bricks and produce some of the finest pressed bricks made.

CHARLES FAIRLAMB was born in Delaware county, Pennsylvania, April 20th, 1827. Having

been raised upon a farm, he enjoyed such educational advantages as the public schools of his day afforded, and devoted his sole energies to agricultural pursuits until he embarked in the present enterprise. His father, Joseph Fairlamb, was a descendant of an English family who were among the earliest settlers in Delaware county. They took a prominent part in the Revolutionary War, and were represented by an uncle of Charles, in the war of 1812. Charles Fairlamb was for fourteen years an active and efficient member of the School Board of his district, and presided over its meetings for a time with dignity and acceptability. He has never sought or held a purely political office, preferring to devote his energies to his legitimate business; though in his quiet and unobtrusive way he has done much for the advancement of prominent local interests.

DANIEL ROBINSON was born in Delaware county, Pennsylvania, October 28th, 1838. His father, Daniel Robinson, was a native of England, and came to the United States about 1825, where he settled in Philadelphia, whence he removed to Delaware county in 1835. After the usual period spent in the public schools of his native county, he was sent to Samuel Aaron's school, at Norristown, Pennsylvania, where he acquired a practical training, fitting him for the duties devolving upon him in after life. He then engaged in farming, and was entirely devoted to that avocation until he embarked in the present enterprise, January 1st, 1874. He is generous and candid in all his dealings, and by his enterprise and business ability he has reaped the reward of his labor. He is public spirited, and a liberal supporter of every movement having for its object the promotion of the public weal.

JAMES MOSSER, Tanner and Merchant, was born February 6th, 1830, at Trexlertown, Lehigh county, Pennsylvania, and is the son of Jacob Mosser, still living at Allentown. The educational advantages offered him were limited, and while still a boy he was employed in his father's tannery. Here he remained until the age of twenty-four, when he, with his brother, entered into independent business. The first year's business, in 1854, amounted to $15,000. In 1859, he united with Alfred G. Saeger and Thomas Keck, and continued as before, increasing their tanning conveniences as fast as their extension of trade justified it. This was rapid, and, in 1863, they established a house in New York to sell their own and others' leather, a branch which, under the style of Keck & Mosser, is still in existence, and with the branch at home does a business of $1,500,000 per annum, being one of the largest leather houses in the country. In 1859, he was elected Director of the Bank of Allentown, and has served about eight years. In the midst of his large operations political subjects have always claimed a fair share of his attention, but he has never aspired to office. In 1856, he married Maria E. Keck, of Allentown, and has three sons and a daughter. A self-made man in all respects, he is still young enough to look forward to many years of activity and usefulness.

PHILIP GUCKES' BREWERY was commenced in 1850, on Front street, Philadelphia. The business was at first a very small one, the production being not more than six barrels of table beer per week. In these early days there was connected with the brewery a retail establishment, where lager beer, then but just coming into use, was sold. The business was continued here for two years, when (in 1852) it was removed to Brown street. By this time the production had extended to ten barrels per week, including porter, ale, and table beer. In 1854, the business was again removed, the location selected being on North Third street, a portion of the premises at present occupied. The production had now increased to forty barrels per week of porter and ale only. In 1856, a malt trade was conjoined with the brewing business, some 3000 or 4000 bushels of malt being produced during the season, which lasts from October to May. The production, in both departments, has continued to increase without interruption, until at the present time it has reached to about 300 barrels of ale and porter per week, and 60,000 bushels of malt during the season. The premises have been extended by purchases at various times, and the brewery now extends through from North Third street to St. John street, covering a space of 100 feet front by 128, including also several adjacent dwelling-houses. The building is complete in every detail, and is fully prepared with every possible requisite for the efficient carrying on of the trade. Having regard to the enormous development of the lager beer trade, which now threatens to supplant the ale business, Philip Guckes built during the year 1873, at great expense, a new brewery on his property in School lane, Germantown, which is devoted exclusively to the brewing of lager beer. The brew-

ery is a three story building, extending 49 feet by 143, and stands in a deep hollow, surrounded by chestnut and beech woods, on a foundation of solid rock. It is so situated as to afford scope for almost unlimited extension by tunnelling out vaults through the rocks, and is fitted with every modern appliance. It is supplied with gas; a constant stream of cold spring water flows through it, and it stands by the side of a large pond, which supplies all the necessary ice at a trifling expense. The ice house is capable of containing 1600 tons, and is supported on two rows of heavy pillars, thus precluding the possibility of any danger of falling. The present capacity of the brewery is 30,000 barrels per annum.

PHILIP GUCKES was born in 1821, in Hesse Darmstadt. He learned the trade of a brewer in the old country, and in 1842 came to America. He was employed in various breweries in New York and Philadelphia; among others, he served for seven years with the late William C. Rudman, a well-known porter and ale brewer of the latter city; until, in 1850, he started in the brewing business on his own account.

IRVINGTON MILLS, formerly known as the Crosbyville Mills, are located on Ridley creek, in the Borough of North Chester. Previous to 1767 there had been erected a grist and saw mill upon the premises, which came into the hands of the Crosby family early in the present century. Having passed through three generations they became the property of Pierce Crosby, grandson of the original proprietor of the name. In 1843, he leased them to James Riddle and Henry Lawrence, who converted them into a woollen mill, which was operated by them until 1845, when they were succeeded by James & D. Irving, who operated as lessees until they purchased the property, in 1854. The building, having been enlarged during the tenancy of the Irvings by the addition of a story for 20 feet of the length, was then 80 by 36 feet, two stories and basement. J. & D. Irving continued until the death of the latter, in February, 1862; and then James Irving became sole proprietor, by purchase, of the deceased partner's interest. Having admitted his son to partnership, January 1st, 1866, the firm became James Irving & Son; and though the son died the following September, the firm name still continues. The old building was removed in 1873, and in its stead there was erected a handsome four story structure, 172 by 50 feet, beside which there is the old saw mill, used as a dye-house, 100 by 40 feet, a wareroom attached to the main building, 100 by 40 feet, and all the necessary outbuildings. This affords room for the operation of ten sets of woollen machinery, 4000 spindles, 200 looms, and all the requisite preparatory and finishing machinery, which will employ 200 hands, consume 500,000 pounds of wool per annum, and produce about 400,000 pounds of yarn; all of which will be consumed in 1,500,000 yards of goods; the 160,000 pounds cotton warps being made at the mill of Irving & Leiper, in Chester. The motive power is derived from 75 horse power in two Leffels' turbine water-wheels, to which was added a 60 horse steam engine, in 1874. The new mill, being filled with the most modern and improved machinery, produces goods even superior to those which have so long enjoyed so enviable a reputation.

BARNDENNOCH MILLS, Irving & Leiper, Proprietors, are located between Front street and the Delaware river, at the corner of Franklin street, Chester. They were erected by James Irving in 1853, but were not put into operation until the spring of 1859, when a partnership having been formed between James & David Irving and Thomas I. Leiper, the firm of Irving & Leiper commenced the production of yarns in the original mill, 46 by 120 feet, three stories in height. David Irving having died in February, 1862, the business has been continued by the surviving partners, and, in 1873, there was added to the main building 113 by 58 feet, which was fitted up with the most approved machinery. There are in addition a picker house, two story engine house, etc., and the whole affords a capacity for the employment of 150 hands, running from 10,000 to 12,000 spindles, consuming about 2500 bales of cotton, and producing about 1,000,000 pounds of cotton yarn per annum. The motive power is derived from a 100 horse engine, which they design to double when the mill is in full operation. All the yarns are sold in an undyed state.

JAMES IRVING was born in New York city, December 7th, 1817, his parents having emigrated from Scotland—his father in 1811, and his mother in 1815. The family removed to Montgomery county, Pennsylvania, in 1824, and James there enjoyed such advantages as were afforded in the ordinary schools of that period, but in his twelfth year he became an apprentice to Bethel Moore in the woollen manufacturing. There he continued until 1841, and after a year spent in Chester county, associated in partnership with his brother, D. Ir-

ving, in 1842, as J. & D. Irving, and engaged in manufacturing at Haddington, where they continued till the winter of 1845, when they removed to the present location. He was an ardent supporter of the Union arms during the War of the Rebellion, and assumed the double charge of all the mills during the absence of his partner, Captain Thomas I. Leiper, in the army. He has shown himself public-spirited and energetic. Since 1870 he has been a Director of the First National Bank of Chester.

THOMAS I. LEIPER was born in Delaware county, Pennsylvania, October 31st, 1834. He is a son of Samuel Leiper, and grandson of Thomas Leiper, who built the first railroad in the United States, in 1806. He attended the public schools of Chester, and subsequently those of Philadelphia, where he attended the Central High School. He went as an apprentice to the manufacturing business with John P. Crozer & Son, at the age of eighteen, and remained until he attained his majority; he then travelled through the West and upon his return became a clerk in the banking house of E. W. Clark & Co., where he remained until he associated in his present enterprise. In October, 1861, he entered the Union army as First Lieutenant of Company A, 58th Regiment Pennsylvania Volunteers, for three years; he subsequently became Adjutant of his regiment, and afterward served one year on the staff of General Kane. He became Captain of his company in the latter part of 1863, and filled that position, as he had his previous appointments, efficiently and acceptably until the close of his term of service, when he returned to the manufacturing. He has devoted close attention to business, but has, nevertheless, been able to serve his city in Councils since 1872.

CHESTER SUGAR REFINERY was established in 1866, by J. Baker and Joseph F. Baker, doing business as J. Baker & Co., and was run by them until 1871. It then passed into the hands of Thomas B. Wattson and B. F. Fulsom, from whom it was leased in 1872 by John H. Barton, by whom it is still operated. The works are located at the foot of Market street, in the city of Chester, and the refinery itself covers more than three-fourths of an acre of ground, while, with out-buildings, shedding, etc., the works occupy four and one-half acres. The main building is sixty-five feet in height, divided into seven stories, and to it are attached sundry four story buildings, which are in turn succeeded by store-sheds and other necessary appurtenances. On the first floor are located the main driving engine of fifty horse power, and the twelve huge furnaces supplying the engines located in different parts of the structure. Among the latter are a pair of double vacuum engines of forty horse power, four pumping engines, one twenty horse, and three fifteen horse each, which supply the large quantity of water required; two steam molasses pumps of fifteen horse each, and a Gibb's steam hoisting engine of fifteen horse power, beside smaller engines for pumping, etc. The raw material is transported in vessels to the wharf on the front of the works, whence it passes to the storage sheds, and is thence rolled into the furnace room, where the hogsheads are emptied into a large vat. The specific gravity of molasses being 38 degrees, its weight is too great to admit of its being lifted to the top of the building, and it is accordingly reduced to 25 degrees by partial boiling and the admixture of sweetened water. After being pumped into receivers in the seventh story, the mixture is passed through filtering screens, or double bags, by which all impurities are removed. The liquor then passes into drones, large cylinders, twenty-four feet long and three feet in diameter, in which has been placed a quantity of charred bone. About twelve hours are consumed by the treacle in draining through the drones. It is then forced into the receiver in the fourth story, whence it passes into the vacuum pans—two large, air-tight, cone-shaped cylinders, capable of holding twenty hogsheads each—where the liquor, in the absence of air, is boiled by steam at a temperature of 120 degrees, known to the trade as "cold boiling." Should the ordinary boiling point of 212 degrees be attained, the liquor would not only burn, but would yield less sugar. After boiling, it is drawn into small iron wagons which remain in rooms where the temperature is 100 degrees for five or six days, during which time the sugar ripens or granulates. The contents of the wagons are then dumped and conveyed to two large mixers on the third floor; these resemble large iron churns, and break up the sugar by a mixing process, preparatory to its being placed in the "centrifugals." The latter are twenty in number, and are situated in the second story; they consist of revolving cylinders about three feet in diameter, with an outer steel casing, and an inner casing, or basket of perforated brass. They are supplied with the black sugar from an iron dumping carriage running on a railway over the machines, and having received the requisite quantity are set in motion, the centrifugal basket making

1600 revolutions per minute. The sugar is thus purged, the rapid motion throwing the sugar against the inner side and casting the syrup through its perforations against the outer steel casing, whence it drains into a receiver, after which it is reboiled to a uniform density, cooled in long narrow tanks, and then placed in large storage tanks on the ground floor; it is barrelled as required for market, where it is known as "Chester Filtered Syrup." In the centrifugals the sugar changes to a light straw color, that can only be whitened by clarification, and having been gathered by the rapid motion into a compact mass, is removed in pans and thrown upon a long sieve, over which it is moved and falls to the floor. It is then immediately put into barrels, weighed, marked and usually shipped the same day. The whole process ordinarily requires from seven to eight days. The business is divided into three departments; that of the engines and machinery being under the supervision of John J. Cooper, an accomplished and skilful machinist; the refining department, under the direction of Stephen C. Hall, well qualified by experience for his position; and the sugar boiling department, which requires the utmost care and skill to insure success, under the efficient superintendence of Elijah Baker. The works employ an average of seventy-five men; they formerly employed about thirty coopers and manufactured their own barrels, but by reason of the action of the Coopers' Union the necessary barrels can be imported from Portland, Maine, at a daily saving of $25. They consume daily twelve tons of coal and sixty hogsheads, or 8000 gallons, of molasses, from which they produce 36,000 pounds of sugar and sixty barrels of syrup.

JOHN H. BARTON was born in Delaware county, January 12th, 1839. After a period spent at the Village Green Academy, he finished his preparation for college at Charlotteville, New York, and in 1856 entered the Sophomore class at Dickinson College, whence he graduated with honor in 1859. He became largely interested in steamboats in 1860, and during the war chartered to the Government many vessels. He spent some time in New Orleans, where he was in charge of the transportation of troops to different points in the Department of the Gulf. During the emergency of 1862, he commanded Company F, 16th Pennsylvania Militia. He has taken a prominent part in politics, and was Chairman of the Republican County Executive Committee in 1863 and 1864; was elected to the State Legislature in the fall of 1866 by the Republican party, to which he adhered until 1872, when, believing the mission of his party ended, he espoused the claims of Horace Greeley for the Presidency, and has since been bound by no party ties. He became attached to the establishment of which he is now the head in 1867, and there continued until 1869, when he associated in partnership with Captain Joseph Baker, under the firm name of Barton & Baker, and built the "Linwood Sugar Refinery," which they operated until it was destroyed by fire, February 17th, 1871. Having leased the present establishment in February, 1872, he devotes his energies to its interests.

RITER & CONLEY, Builders of Blast and Siemen Furnaces, Rolling Mill Stocks, Iron Roofing and Oil Tanks, Pittsburgh. This business enterprise was originated in 1864, by James M. Riter (now deceased), who was a brother of the present senior partner. He was succeeded by the existing proprietors, who took charge of the establishment in April, 1873, and continue to carry on the former heavy operations of the manufactory. The premises occupied by the firm are situated at Nos. 55 and 56 Water street, and have a frontage of 48 feet, with a depth of 160 feet, two stories in height. With the exception of the office, which is conveniently placed on the first floor, in front, this story is used as a workshop for preparing the sheeting for the various articles of manufacture. There are here four punching machines, to which are attached rack-tables, of their own patent, for punching in a circle. This machine is a great feature of their works, being the only one of the kind in the country. Machines for bending the plates and angle-irons are also in this department. In close proximity are the blacksmiths' forges; and here blast and Siemen furnaces are put together. The floor above is devoted to lighter sheet iron work; also copper steam pipes and stills, goosenecks, retorts, worms, etc., for the proper distilling of whiskey. During the War of the Rebellion the establishment was largely engaged in manufacturing copper work for the Monitors, in which the proprietors were very successful. Within the past two years they have erected five blast furnaces, two at Port Washington, Ohio, and three in Pittsburgh; the former are said to be the largest in the United States. They are now engaged in erecting two of the largest size ever made, on the Ferre system. Their specialty is heavy sheet iron work, and during the past year they have built oil tanks of a total capacity of 1,100,000 barrels, having

special machinery, covered by letters patent, for preparing and punching the plates. They also manufacture iron roofings, having fulfilled large contracts for covering mills and furnaces. Indeed, their contracts are of the largest ever received; and, as they have such extensive facilities to build furnaces, rolling mill stacks, oil tanks, iron roofing, it is not surprising that they have enjoyed unexampled prosperity and success. There are about 175 operatives employed, and the weekly consumption of iron is about sixty-two tons. Although the great financial panic of 1873 affected many commercial firms and manufactories throughout the country, this establishment did not reduce the hours of labor or the wages of their men, but continued on, in spite of the ruin which surrounded but did not harm them.

THOMAS B. RITER was born in Blair county, Pennsylvania, in the year 1840. He received but a very limited education, and when fourteen years old commenced work, and learned the trade of a sheet iron worker in the shop of which he is at present a part proprietor.

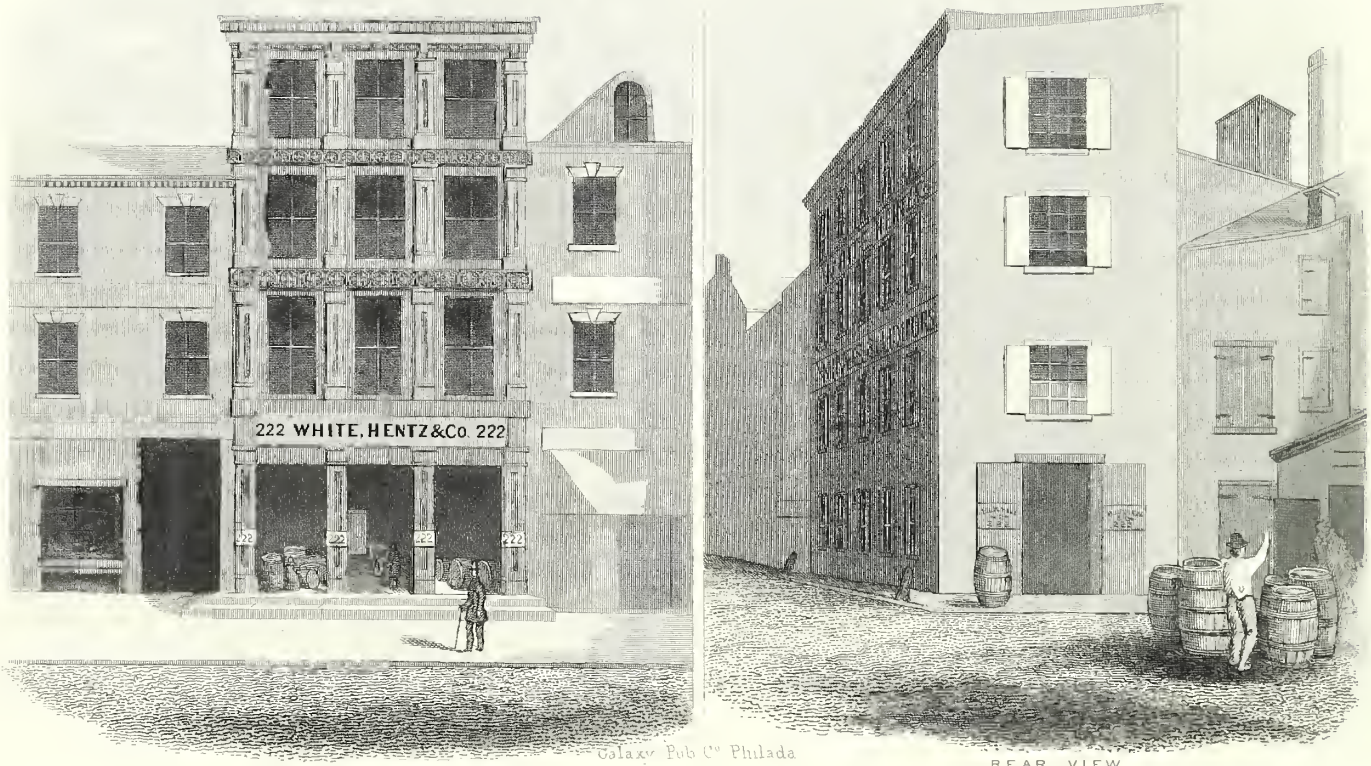
WILLIAM H. CONLEY was born in the city of Pittsburgh, also in 1840. When but eleven years old he entered a printing office, where he remained for ten years, working in its various departments. He next became book-keeper for James M. Riter, whom he served with faithfulness and competency; after the death of his employer, in connection with Thomas B. Riter, he purchased the establishment.

SUMMERDALE PRINT WORKS, owned by Charles H. Wilson & Co., are situated on the Asylum road, near Frankford, Philadelphia. The business is that of dyers and printers of cotton goods, and was established in 1834, by John Large, who had learned the business in England. The establishment was at first of but small extent, the building being of the size of 30 feet by 60, and the number of hands employed but twenty-five. In those early days all the labor was performed by hand, the use of machinery being altogether unknown in the trade. The quantity turned out was then about 4000 yards of finished goods per diem, the quality being of an inferior order. In 1853, Charles H. Wilson, who had been employed in the business for several years, became the proprietor of it, having purchased it of John Large. Under his able management the trade has increased enormously, and is still capable of great extension. The size of the present main building of the factory is 180 feet by 50, besides four other old buildings. The engines are of 185 horse power, and the number of hands employed is 120. The production is about 40,000 yards of finished goods per diem, of about $2800 value. The house is noted for the superior quality and general fineness of its manufactures, especially for the kind of goods known as "Penn cambric," which is its specialty and which for years has taken the lead in the market for that class of goods. Among the manufacturers of Pennsylvania this house holds a most worthy place.

THE McHAFFIE DIRECT STEEL CASTINGS COMPANY, Lamokin, Delaware county, Samuel Archbold, President.—This company was formed early in 1871, for the manufacture of steel by a new process, which had suggested itself to Samuel Archbold during a discussion in a society of engineers in session in London. Having imported satisfactory samples, he was delegated to proceed to Glasgow, Scotland, for an inspection of a similar works there. Upon his return, he was accompanied by Neil McHaffie, who thoroughly understood the process and had agreed to devote one year to the establishment of the works. A site having been selected at Lamokin, Delaware county, Pennsylvania, and suitable buildings erected during the summer of 1871, operations were commenced in September of the same year. The works, which now include pattern and blacksmith shops, foundry, about 40 by 150 feet, with blowers, planing machines and every usual convenience, and annealing furnaces separate, produce castings varying from a half ounce to six tons, and far surpass the works in Glasgow, especially in the matter of heavy castings. They give employment to about forty hands, consuming about 600 tons of material per annum, producing from the same about 500 tons of fine steel, worth about $155,000. The works can be extended to almost any limit to meet increasing demands.

PHILADELPHIA STEEL WORKS, William Baldwin, Proprietor, are located at the corner of Margaretta and Bermuda streets, Twenty-third Ward, Philadelphia. They were established September 16th, 1864, by William Baldwin and Thomas Banes, for the purpose of manufacturing the finer qualities of hammered cast steel, required by tool

Wm. Baldwin



FRONT VIEW

Galaxy Pub Co Philada

REAR VIEW

White, Hentz & Co. Rectifiers of Spirits & Importers of Wines & Liquors.

222 NORTH SECOND STEET. PHILADELPHIA. PENNA

makers, die sinkers and others, who need a high grade of steel. The success of this establishment has been such that it has been necessary three times to double its capacity. Baldwin & Banes associated with them Miers F. Livezey, January 1st, 1866, as Baldwin, Banes & Co., and this firm continued in successful operation for three years, during which time their steel was introduced into every State in the Union and obtained a reputation of which its manufacturers were justly proud. Thomas Banes, desiring to engage in other business, sold his interest to the two remaining partners, February 10th, 1869, after which the firm was known as Baldwin & Livezey, until failing health obliged the latter to retire from active business, and his interest was purchased, April 1st, 1872, by William Baldwin, who has since conducted the business alone. The buildings were formerly occupied for other purposes, and are somewhat irregular in form, having been enlarged from time to time as there was a demand for increased capacity. The machinery, which includes a sixty horse steam engine, seven boilers, six direct double acting steam hammers, with a striking force of 3000, 2000, 1500, 1000, 1000 and 600 pounds respectively, a trip hammer, a forging machine for making sledges, hammers and blacksmiths' and machinists' tools, with all other articles required for the effective operation of the works, is all of the most approved pattern and is valued at about $150,000. These works, having doubled their capacity within the past year, produce tool steel of the finest quality, cast steel forgings, sledges, hammers, blacksmiths' and machinists' tools, and aggregate about 1500 tons of steel per annum. They employ sixty men, at salaries ranging from $12 to $100 per week, while the weekly pay roll amounts to about $1200. They were among the earliest to manufacture a quality of steel to compete successfully with that imported, and by untiring energy, perseverance and care a steel has been produced in large quantities that has stood the severest tests and is well and favorably known from Maine to New Orleans, and from the Atlantic to the Pacific.

WILLIAM BALDWIN was born in Philadelphia, August 8th, 1820. His father, William Baldwin, came to the United States in 1818; he had been previously one of the most prominent business men of England, controlling, in connection with his partners, the cattle market of all England. His mother died in 1826, and he attended a select school at Bridesburg, Philadelphia, and afterward a boarding school at Bordentown, New Jersey. His father having died in 1832, he was left an orphan to get his education as best he could in the intervals of labor; he became an apprentice to the carpenter's trade with William Berger, at sixteen, and served for four years. After working as a journeyman for three weeks he engaged in business for himself at Holmesburg, where he remained four years. Having returned to Frankford, he married Rachel Hague, of that place, in April, 1845. He went to Nashville, Tennessee, in the autumn of 1846, and in that of 1847 to England, where he spent one year. Returning home, he associated in partnership with Miers F. Livezey, as Livezey & Baldwin, and engaged in the lumber business at Frankford avenue and Oxford road. They erected a steam saw and planing mill, 40 by 80 feet, the first outside the limits of the city proper, which they operated until April 1st, 1856, when they sold to Hayes & Ellis. This enterprise having given way to the steel manufacture, he has since devoted his whole energies to the latter. He has been twelve years a director of the Germantown Bank, and has been a liberal and public-spirited promoter of public enterprise. Plain and unassuming as he is courteous and benevolent, he is valued as a friend and esteemed by all who know him.

WHITE, HENTZ & CO.'S RECTIFYING AND LIQUOR HOUSE, located at No. 222 North Second street, is the oldest representative of its class in the State of Pennsylvania. It was founded prior to 1790, by Philip Wager, at that time a gentleman of high business standing and of the most persistent enterprise. The date of its establishment leads to a retrospect of that period. High (now Market) street was the great highway, and though its mercantile houses scarcely extended beyond Sixth street, it was regarded as an unusually fine business thoroughfare. West of Sixth, near the corner of which stood Washington's residence, High street was occupied by private mansions, surrounded by magnificent grounds. Front street, north, now bristling with commanding warehouses, in many of which even to-day, though now greatly changed, can be traced a close resemblance to the buildings which formerly filled the street, was considered the "Court End" of the town. Water street was filled with handsome mansions; the City Hall and Dickinson College lotteries were attracting local attention; a fine company was playing at the old Southwark theatre; Peale's celebrated museum, in Lombard street, was daily and nightly thronged, and the wharves were lined

by large ships laden with wealth for Stephen Girard and the merchants contemporaneous with him. It was at this time that Philip Wager, who had previously embarked in successful business ventures, became the proprietor of a three story building on the site of the present structure, and commenc d the trade which has been so successfully conducted by his successors. The present firm is in possession of the relics of his old counting house, and from the musty and time-stained papers and books is extracted the information that Philip Wager, within a very short time of the foundation of the house, secured a most extended business connection, filling and making extensive contracts. This was long before the advent of steam as a motor, and the transportation of goods became a matter of much delay and difficulty; but in lieu of the freight car was the ponderous Conestoga wagon, which has survived the usual changes of time to the present period. Daily were these unwieldy but capacious vehicles to be seen before the old warehouse, which then was a model in its way. Its three floors were filled with tiers of casks and barrels and long ranges of boxes. The liquors they contained were of the finest importations, and of the best native manufacture. By the care with which he selected the various brands, Philip Wager secured a fine reputation, and so reliable became his liquors for tone and purity, that his patronage obtained the widest range, some of his orders coming from the most remote portions of the country. Among the letters still remaining as mementos of a remarkable period of Philadelphia's local history are many which vividly recall the primitive life, the evidences of which have nearly all disappeared through the triumphs of invention and the master spirit of enterprise. Philip Wager was one of the few men who conducted business upon fixed and correct principles, not the least important of which may be expressed in the words, "Pay as you go;" and to this steadfast purpose, thoroughly carried out, may be attributed his large success as a merchant, and the foundation of a fortune which eventually reached a very large figure. Early in the present century the name of Philip Wager as proprietor ceased to appear upon the books of this house, Van Syckel and Garrison having succeeded him in its management. They made no change in the policy hitherto pursued, the soundness of which was shown in the unabated prosperity of the firm. The gentlemen who followed them were alike noted for their sterling integrity and fine business tact, and the personnel of the establishment, from the period of its inauguration, has all along possessed an invariable tone of high respectability. Upon the withdrawal of Mr. Garrison, new partners, the sons of Mr. Van Syckel, were admitted, and the firm name was then Van Syckel & Sons. Under the watchful supervision of this company the business was brought down to the year 1849, when the senior member, Elijah Van Syckel, withdrew, his interest having been purchased by William R. White, who became the head of the firm of White & Van Syckels. During the connection of the elder Van Syckel with the house, it enjoyed a rare degree of prosperity, its relations extending in every direction and covering a vast section. Its pecuniary returns may be approximated when it is stated that upon the retirement of Elijah Van Syckel he had secured a fortune valued in the aggregate at one million. William R. White, who succeeded him, was a well-known and highly-esteemed merchant of Philadelphia. His native State was Maryland, but at an early age he removed to Pennsylvania, and upon arriving at manhood engaged in the wholesale grocery business, securing soon extensive commercial relations with the East Indies. As was usual in those days, he combined with this business a large liquor trade; the two together not only giving him great prominence as an enterprising merchant, but securing to him most profitable returns. Ten years later the firm of White & Van Syckels was dissolved by the death of the Messrs. Van Syckels. A new partnership was then formed, consisting of William R. White, of the late firm, and J. Henry Hentz, the senior partner of the present firm, under the firm name of White & Hentz, by whom the business was continued until the beginning of the year 1865, when the former withdrew absolutely, and J. Henry Hentz became, as he still continues, the head of the house, and to his untiring devotion its great success and exalted reputation to-day is mainly due. Its business has the widest ramifications; its stock is of the rarest quality, of great variety and immense bulk. Besides its business of rectifying, the firm imports the finest qualities of wines, brandies and general liquors; making a specialty of fine brands of whiskeys, of which they carry a large stock, ripening in their brick warehouses and ready for market. Notwithstanding the complete retirement from the partnership of William R. White, after securing to it the large benefits of his careful training and experience, the present senior member decided to retain the old name of White & Hentz, with a slight modification, making it White, Hentz & Co., having given an interest in the business to his brother, William A. Hentz, which expired at the close of the year 1870, and was not renewed, and to J. P. Robinett, his present associate. Since the

S. Henry Hunt.

William R. White

Henry Robinett

time of the elder Van Syckel, under whose régime also it was unusually great, the business of the house has increased fivefold. This may be attributed to the growth of commercial facilities, of which Mr. Hentz has taken the fullest advantage, thus bringing within the range of his house sections in remote foreign lands and far in the vast interior of our own continent. The financial stability of the house, from 1790 to 1874, is one of the evidences of a continuous exercise of rare judgment, and careful investments. It has never been compelled to issue a note, nor has it been shaken by any of the severe financial crises which have since occurred. It is an interesting fact in this connection, that although additional property has been purchased, and costly improvements made, still the business is continued on the very spot where it was established prior to 1790. It may be added that Mr. Hentz is a gentleman of large public spirit, an unwavering adherent to high moral principles, and is distinguished by the most affable manners.

HOSTETTER & SMITH, Manufacturers of "Hostetter's Stomach Bitters," have their works in Pittsburgh. The firm consists of David Hostetter and George N. Smith, and in their operations they use a formula discovered and used by Dr. Jacob Hostetter, late a distinguished practitioner of the Science of Medicine, in Lancaster county, Pennsylvania. The original works were located near the corner of Penn and Hand streets, where they commenced operations in 1853, employing about six hands and having a capital of about four thousand dollars. The rapidly increasing demand for their product soon demanded a capacity unattainable in the original works, and they accordingly purchased a portion of the present works in 1858. Year by year their trade increased, and one by one additions were made, until the works consist of a massive three-storied structure, with a frontage of 112½ feet on both Water street and First avenue, with an intervening depth of 160 feet. This building is fitted up with all the most approved machinery for compounding, bottling, pressing, printing, etc., the whole being driven by a low pressure engine of forty horse power, built by A. Hartupee, and to which steam is supplied by a magnificent steel boiler. A large elevator of Miller's patent affords communication between the different floors. In the third story are fifteen large tanks with a capacity of about 10,000 barrels, while upon the second, which contains the bottling establishment, are ten receivers with a capacity of 12,330 gallons, and from which are drawn, as required, the prepared bitters. The printing department is separated from the other portions of the building by a blank wall, as a protection in case of fire; it contains ten of Campbell's presses, upon which are annually printed nearly 10,000,000 almanacs, in nine different languages, beside five job presses, four presses for printing labels, eight Chambers' folding machines, etc. In this department about 15,000 reams of paper are consumed per annum, and about ninety persons find employment. An admirable system pervades the whole establishment, each department being under the supervision of a competent head, and there is a daily product of over 500 cases, containing one dozen bottles each. The operations employ between 175 and 200 hands, for whose safety and comfort the greatest care is exercised, and the structure is secured against serious damage by fire by a six-inch water pipe running through the whole building, with a hose attached on every floor. The bitters have become widely known through all parts of the United States, Mexico, South America, and Australia; and over 1200 druggists are engaged in their sale, while thousands attest their value and efficiency as a tonic. This enterprising firm began in an humble way, but by well-directed energy and undeviating integrity has advanced by rapid strides to its present proud position in the business world. Its enterprise and activity has contributed vastly to the commercial interests of the Iron City, and not a little to the trade of New York, Philadelphia, Baltimore, Chicago, San Francisco, and other sister cities. Its liberal patronage of newspapers as a medium of advertising necessitates a large outlay, but discretion and superior judgment in this regard has uniformly manifested itself.

DAVID HOSTETTER was born January 23d, 1819, in Lancaster county, Pennsylvania, whither his great-grandfather, Jacob Hostetter, removed from Germany in 1735. He erected a stone house, still standing, and there his son Jacob was born, July 1st, 1752. The latter inherited 320 acres of the large landed estate of his father, and was in turn blessed with three sons: Jacob, the father of David, being born April 18th, 1791. During the War of 1812, Jacob and one brother were actively engaged, but the other, proving disloyal, was disinherited by his father, who died December 9th, 1823. Jacob Hostetter, M. D., was a graduate of Jefferson Medical College, in Philadelphia, and only died March 26th, 1859, after a long and useful professional career. David Hostetter was educated

in his native county, and on April 15th, 1835, entered a dry goods store in Lancaster, where he continued until 1842, when he engaged in business on his own account in the same city, and continued until April 15th, 1850. Then he started for California; upon his arrival in San Francisco, he engaged in business, but having been burned out in September following, he returned discouraged to the place of his nativity. There, in 1853, he associated with George N. Smith, for the prosecution of the present enterprise, and since that date profit and honor have attended his exertions; and though meeting obstacles and reverses that would have discouraged any ordinary man, he has steadily pursued his successful career. In 1867, he became a Director in the Pittsburgh Gas Company, of which he was chosen President in 1869, and has since discharged the duties of that position with ability and credit. He is also the largest stockholder in the East End and Allegheny Companies, and is usually a prime mover in every public enterprise. In March, 1874, he purchased the charter of the Columbia Conduit Company, and set about the completion of that important work with his usual promptness and energy, having been subsequently elected President of the organization, but declining the proffered honor. He is a Director in the Farmers' Deposit National Bank, as well as in the Fort Pitt Bank, and the Penn Gas Coal Company of Philadelphia, of which he is one of the largest stockholders. He was married, July 13th, 1854, to Rosetta Rickey, of Cincinnati, Ohio.

SUNNYSIDE MILLS, J. Ledward & Son, Proprietors, are situated at the corner of Morton avenue and Ledward street, Chester, Delaware county. They owe their establishment to the firm of Lenny & Burk, who erected a two story building 55 by 100 feet, but never put the works into operation. James Ledward purchased the property July 26th, 1866, and having filled the mill with the most approved machinery, removed to Chester, December 16th, 1866, and commenced the production of cottonades, cassimeres, doeskins, etc., with a force of fifty hands. He added 30 by 20 feet to the two story picker house, in 1867, and continued to enlarge each successive year. The firm assumed its present style July 1st, 1871, when John J. Ledward was admitted to the partnership. Their warehouse was destroyed by fire January 4th, 1873, and this disaster was followed, March 17th of the same year, by the heavier loss of a building, 30 by 90 feet, used as picker house, warping and beaming rooms. Nothing daunted, they immediately erected an addition to the main building 126 by 55 feet, a dye house 70 by 43 feet, a warehouse 60 by 30 feet, and a two story fire-proof picker house 43 by 32 feet, with boiler and engine rooms 30 by 20 feet, all of which were completed during the year. January 1st, 1874, found them with 103 hands, operating 72 looms, 4 sets of cards, 2 self-acting mules of 600 spindles each, 2 warping mills, 7 double twisting frames, 5 spooling frames, and all necessary preparatory and finishing machinery. All this is propelled by a 60-horse Corliss steam engine, driven by 2 sets of tubular boilers. The parts of the building recently erected are being rapidly filled with the best of machinery, and the whole capacity of the mill will be fully doubled. They turn off about 3500 yards of goods per day.

JAMES LEDWARD was born in Ashton, Underlynd, Lancashire, England, December 14th, 1823. His mother having died when he was six years of age, he was denied many advantages of early education; but he was not to be deterred from the acquirement of that knowledge so essential to his future success in life. At the age of eight years he was bound out and obliged to enter the mills, where he patiently mastered all the details of his business and became an excellent weaver. He worked in the mills of Thomas Mellor & Brother, in his native town, until 1845, when he came to the United States, where he commenced weaving for Joseph Ripka, at Manayunk, and at the end of five months became his foreman. Having married in February, 1847, he removed to Upland, Delaware county, where he engaged as foreman for John P. Crozer & Son, and so continued until 1851, when he removed to Chester to start the first looms ever run in that city, for James Campbell, in the old jail, now used as a market house. He remained in that position until 1853, meanwhile saving his first $1000 and becoming a citizen of the United States. He then rented a room in what is now known as Sciota Mills, at Manayunk, and engaged in the manufacture of carpet yarn on his own account, and continued until 1859, when he commenced operating Daniel Nippes' mill, on Mill creek, for the production of carpet yarn, knit goods, and jeans. In the early part of 1864, he occupied the Good Intent Mills, in West Philadelphia, where he manufactured twilled jeans until he removed to Chester. His active energy and enterprise have achieved for him a marked success, and he stands as a fit sample of a self-educated and self-made man. He was elected to the City Council of Chester in 1870, was re-

Armory, Fair, Hill, & Company's Mill, Co. Line, Mass.

Armory, Hall, Offices & Laboratory, U.S. Arsenal, Allegheny, Pa.

James Ledward

elected in 1873, and has taken an active part in the promotion of its best interests.

JOHN J. LEDWARD was born in Upland, February 2d, 1849. He attended various schools, and finished at the Treemount Seminary, in Norristown, Pennsylvania. He entered the mills in his youth, and grew up to the business, mastering all the practical details, and working with his father until admitted to partnership.

THE SPEARMAN FURNACES, Sharpsville, Mercer county, owned by the Spearman Iron Company, of which J. J. Spearman, B. H. Henderson, Joseph Forker, John Phillips and Walter Pierce are members, were commenced in 1872. The premises consist of thirteen acres of ground situated in the borough of Sharpsville, on which are erected two furnaces, with the necessary buildings, and five double tenement houses. The power is furnished by two vertical engines, built by McIntosh & Hemphill, of Pittsburgh, each with 72-inch blast cylinder, 30-inch steam cylinder, and four feet stroke; these dimensions being sufficiently large for all the furnace engines in the valley. Lake Superior iron ores are exclusively used, and the amount necessary for one working day is about fifty-two tons; fifteen tons of limestone and ninety tons of coal are also daily consumed: all these articles are delivered on the ground. The amount produced averages 1000 tons per month. But one furnace is now running constantly, and this has yielded the above figure. The works are in a flourishing condition, considering the present state of the iron market. J. J. Spearman is the Manager of the works, the other members being mostly new to the business.

J. J. SPEARMAN was born at McKee's Gap, Blair county, Pennsylvania, December 17th, 1824, of American parentage, and is the son of Francis Spearman of that place. He was educated in Bedford county, Pennsylvania, and after leaving school, in 1841, entered as a clerk in the employ of Dr. Shoenberger, a pioneer in the iron business in this section, and whom, in 1847, he accompanied to Mercer county as Manager; remaining with him in this capacity until 1853, at which period he went into the furnace business on his individual account, at Mazeppa Furnace, near the town of Mercer. In 1859, he proceeded to Sharpsville, as Manager for General Pierce, with whom he remained until 1862; and then went to Wheatland, in the same county, as Manager for Woods & Sons, of Pittsburgh, and was in their employ until 1870. After remaining some months in inactivity, with others he became interested in his present enterprise, and established the works which bear his name, and of which he is Manager. In 1872, he was elected President of the First National Bank of Sharon, which position he yet retains. Personally, he is of medium size, with a pleasing intellectual expression. Beginning life at the lower round of the ladder, he has by his own exertions, by assiduous attention to business, and by a strict adherence to that best of all policies—undeviating honesty—accumulated a handsome competence.

FINK & BOYER, Brewers, Harrisburg. This establishment is located on Third above Locust street, and was originally owned and conducted by John C. Burnitz, with whom the present senior partner worked for nine years, at the end of which time he leased the premises and commenced the business on his own account, having associated with him his brother-in-law, Christian Boyer. The capital in cash with which the firm began was but $600, and they produced about fourteen barrels per diem of ale and porter; this, of course, only during the fall and winter months. Their business, however, steadily increased until, in 1865, they manufactured 4000 barrels during that season, amounting to some $36,000. They attribute their great success to the excellence of the materials used, their careful manipulation, but above all to the constant supervision they exercise over all the details of their business, and their industry, energy and a desire to excel, in quality especially, in the production of pure, unadulterated malt liquors.

HENRY FINK was born in Vollmerz, Germany, September 7th, 1835, and is the second son of Conrad and Helen Fink. His father was a farmer in good circumstances in that country. He received an excellent education in his native village, and, in accordance with the usual German custom, was apprenticed during his boyhood to learn a trade. He selected that of the brewing business, and became thoroughly conversant with all its details. On arriving at the age of eighteen years, he emigrated to the United States, whither his parents followed him one year later. They sold their landed estate and other property at a considerable sacrifice, insomuch as to throw their son, Henry, upon his own resources. He now effected an en-

gagement with John C. Barnitz, in whose employ as a journeyman he remained nine years; and by dint of industry and the practice of a severe economy he was enabled to save sufficient money to start in business on his own account. His father died in 1855, within a year after his arrival in this country; and his mother survived her husband eleven years. He is generous and public-spirited, seeking in every way to promote the prosperity of the city which he has made his home.

CHRISTIAN BOYER was born in Langenbentigen, Germany, and was there educated. When thirteen years old, he came with his father to the United States, and for some two years was employed on a farm. He then became an apprentice to W. O. Hecock, and learned the cabinet making business, remaining in that establishment altogether eight years, during part of which period he was a journeyman. At the age of twenty-three, he formed a co partnership with Henry Fink, as above stated.

EDWARD DITHRIDGE, Glass Manufacturer, Pittsburgh, was born in Birmingham, England, August 22d, 1804. His father (who was born in May, 1782, and died August 24th, 1835) emigrated to the United States in 1812. The mother (born January 20th, 1784—died April 1st, 1870) arrived in this country in 1815, on the ship "Euphrates," which was nearly lost in the great storm of that year. The father and grandfather of Edward Dithridge were both skilled workmen in glass, and his father, upon his arrival in this country, speedily found employment at Bakewell, Page & Co.'s glass works, then recently established. The breaking out of the war of 1812 prevented the rest of the family from joining him until 1815. The son attended school until 1817, after which he worked for one year in Doddridge & Co.'s glass works, in Wellsburg, Ohio, and the next year with his father at Bakewell's. The succeeding year he was employed at the refinery of the Old Union Rolling Mill Company, in "Pipetown," and, in 1821, removed with his parents to New York city, where, with his father, he worked for nine years, saving enough in that time to enable him to take two shares, of $1000 each, in a co-operative glass company that was started in Baltimore. In order to help the enterprise to a successful establishment, he agreed to pay the wages of both his father and brother, maintaining his own family at the same time. By inattention of others to their duties and general mismanagement, the concern in two years' time was bankrupt, and the savings of his life lost to Edward Dithridge. After travelling by stage to Boston and thence to Philadelphia in search of employment, himself and father walked in eight days from the latter place to Pittsburgh. Here, in 1832, they entered the glass works of Curling, Higby & Curling, at the Fort Pitt Glass Works, a small establishment, built five years before. The father lived but three years after; the son continued to work for the same firm until he was admitted into a partnership formed under the business title of Curling, Robertson & Co. The house was very successful, principally because of the judicious management of the manufacturing department, which, for the last forty years of his life, was under the care of Edward Dithridge. From 1856 to 1860, in consequence of enterprises, outside of its legitimate channels, undertaken by the other members of the firm, the resources and business of the house were crippled, and in 1860, contrary to his wish, the senior partners insisted upon going into liquidation. This, with the secession of the South, rendered his prospects most gloomy. Nothing daunted, however, by the weakness of others, he determined to make an effort, alone, to retrieve his fortunes. At the beginning of May, 1861, he leased the old works, and with only $2500 of capital, took up the thread of business where it had been broken off by the assignment of the firm. He concluded to make a specialty of the manufacture of his oval lamp chimneys, for which letters patent were granted October 8th, 1861, to himself and his eldest son, Edward D. Dithridge, he rightly judging that the use of petroleum oil would become almost universal, and, spite of the shrugs of unbelievers, firm in his opinion, he resolved, by the use of the finest flint glass and skilful workmanship, to produce the best article of the kind in the market. His venture was rewarded with complete success; the demand for his goods almost immediately became so great as to tax the utmost capacity of the works, and continued thus for the remainder of his life. So large was his trade, that in a few years he was enabled to pay $25,000, to rid himself of the entanglements of the old partnership, and to purchase the works for as much more. He died on June 22d, 1873. He was an earnest believer in the equality of all mankind in the sight of God, and was an early and outspoken Abolitionist, when the avowal of such sentiments invited social ostracism. An ardent friend of the Union cause during the War of the Rebellion, he contributed two sons to the service of the country, one of whom, his youngest, now fills an unknown grave upon a Virginia battle-

Edw = D'Throop

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field; his means were also lavishly expended to aid in meeting the expenses of the war, and he invested all his available capital in the bonds of the nation. He was an earnest advocate for free public education, and established a school for the benefit of the youth employed at his works. His instincts were pre-eminently unselfish, so much so as almost to form a defect in his business character; had he been able to turn a deaf ear to appeals to his heart, he would have died worth millions, as his business judgment was first-class and his investments and all the operations that came under his own supervision were remarkably successful and prosperous. In religion, he was inclined to be a Liberal. Originally a member of the Methodist Episcopal Church, he left that body on account of its subserviency to the slave power, and erecting a little church, mostly with his own means, he joined a body of Wesleyan Methodists, whose motto was, "God is no respecter of persons," and with these he worshipped for many years. He looked at all subjects through the intellect, desired to know the "why and wherefore" of everything. His was the mind which makes a statesman; his views were wide and comprehensive, and any question or subject with which he grappled he mastered it in accordance with true principles. A disposition on his part to magnify the deficiencies of his early education caused him to shun and reject the places of political preferment which his fellow-citizens frequently solicited him to accept. He died, disturbed, as he himself stated, by "no cloud of doubt," conscious to the last moment of those around him, he only, of all, reconciled to his departure. His life was an example of what may be attained by industry and ambition to excel in the vocation in which a man's life is cast; an example of devotion to the good of others, of subordination of self to the higher qualities of heart and soul.

B. L. FAHNESTOCK & CO., Wholesale Druggists and Manufacturers of White Lead, Pittsburgh. The white lead business of this firm is carried on under the incorporated name of the Fahnestock White Lead Company. B. L. Fahnestock, the senior partner, was the original founder of the Iron City White Lead Company, which began operations in 1863, and which, nine years later, was incorporated by an act of the Legislature into the Fahnestock White Lead Company. The salesrooms and offices of the company are located at No. 76 Wood street, Pittsburgh, and the building is a commodious four story structure, with an L extension one story in height. The manufacturing establishment of the firm was originally situated on Liberty street, but it was destroyed by fire in 1872. It was rebuilt the same year at Dallas Station, on the Pennsylvania Railroad. The building is fitted up with all the modern improvements in machinery, and in this respect alone is in advance of any similar establishment in the Union. It is also very extensive, covering an area of two acres. The manufactory is supplied with the patent retorts, propelled by steam, used in the manufacture of glassmakers' lead, red lead, litharge, etc. They also manufacture and grind paints of all colors, doing an extensive business in this alone. The company employs some fifty hands in the various departments of its manufactures, some of whom are employed in putting up its popular proprietary medicines, well known through the medium of newspaper advertising, viz.: Vermifuge, Lung Syrup, Worm Confections, Dr. R. A. Wilson's Pills, etc.

A. A. MYERS & CO., Tanners, Curriers and Dealers in Leather, Lancaster. This business was begun in 1863, under the name of A. A. Myers, on East King street, in buildings about 30 feet square. The operations were of a very limited character. At the expiration of three years the expansion of business necessitated a change of site. The present works are situated on South Water street, the lot comprising two acres, on which buildings suitable for more extended operations were erected. The main building, 40 by 60 feet, is three stories high; another brick structure, 40 by 20 feet, is two stories in height. An engine of ten horse power supplies the motive power. The number of hands now employed is fifteen, and an annual production of leather to the amount of 5000 hides is reached. In addition to this manufacture, extensive operations are prosecuted in the leather and shoe finding business. A market is found in Philadelphia and New York, and quick sale is had for all their productions. The present firm was organized in 1868.

A. A. MYERS was born in Lancaster city, June 10th, 1836, and is of German extraction. He was educated at his native place. At the age of seventeen he began to learn the trade of tanning and currying, and served a period of four and a-half years, after which he worked as journeyman at Baltimore for two years. Removing to Cincinnati, he worked a year in the employment of Jesse L. Grant, father of the President. Returning to Bal-

timore, where he remained for a short time, he afterwards proceeded to Lancaster. In about six months he began business in East King street. He has a family of two children living. He has been twice married, the second time in November, 1874.

PITTSBURGH ARCHITECTURAL IRON WORKS, owned and conducted by H. A. Freyvogel, were established by John Anderson, in 1833, and, known as the Monongahela Foundry, managed by him until 1846, when his son, William J. Anderson, became associated in partnership with him, and business was prosecuted under the name and style of Anderson & Son. The partners then proceeded to interest themselves in the manufacture of hollow iron ware, employing a force of twenty hands. That firm continued in existence until 1853, meeting with varied success, and at this date admitted Ormsby Phillips to an interest in the establishment. Subsequently, the firm was known as John Anderson & Co., and the association endured for about nine years. In 1862, John Anderson retired from the partnership, and William J. Anderson and O. Phillips managed its affairs until 1864. At this date H. A. Freyvogel, while the house was doing a business of $33,000 per annum, purchased the interest of the latter partner, and the firm became William J. Anderson & Co. Immediately upon identifying himself with this enterprise, H. A. Freyvogel introduced the manufacture of architectural castings, a department of industry eminently fitted to give scope to his peculiar and valuable abilities. The new firm continued in existence until August 19th, 1872, when William J. Anderson retired, and his associate carried on the business alone. Under his enterprising and talented management the affairs of the house rapidly became of a very extended and important nature, and assumed greater proportions than had even been anticipated. Conjoining prudence and economy with matured boldness and untiring energy, he soon acquired a wide-spread reputation as an able and energetic business man; and exhibiting in all transactions, large or small, an inflexible and undeviating rectitude, rapidly won an enviable reputation as a trustworthy and honorable merchant. He does a business at the present time of about $150,000 per annum; his extensive establishment occupies an area of 210 by 160 feet, and furnishes employment to 130 men, thereby affording direct sustenance to about 600 persons. His specialties in manufactured articles are bridge work, fronts of buildings and builders' iron work generally. The articles manufactured at his works are highly esteemed for the accuracy, solidity and finish displayed in their casting and elaborating, while the promptitude and reliability characterizing all his business relations have insured him an extensive and highly remunerative patronage.

HENRY A. FREYVOGEL was born in Pittsburgh, in 1836, and received a preliminary education in the common schools of that place. Subsequently, he pursued a course of higher studies in the Western University, and in 1845 engaged in business, working through the day and attending school in the evenings. At the expiration of three years, passed in this manner, he found himself possessed of sufficient means to defray the expenses attendant upon a year's course at the above-mentioned university. Accordingly, he re-entered that institution, and at the termination of the allotted period learned the trade of a moulder in an iron foundry. After working for four years in this establishment, he occupied himself for one year in the study of book-keeping, then returned to his former occupation of moulding. He was thus steadily employed until 1855, when he entered into mercantile life as a clerk in the house of which he is now sole director and proprietor.

STAR LOCK WORKS, Philadelphia, owned and conducted by Hillebrand & Wolf. These works were originated by Conrad Liebrich. In July, 1836, with a staff consisting of one man and a boy, he commenced to make locks in a small two story building on Eighth street below Chestnut. Very soon after this small beginning, an adjoining baker's store was taken in to meet the demands of the growing trade; in 1844, two more stories were added, and a structure of similar size was erected in the rear, thus giving the premises a frontage of 23 and a depth of 110 feet. Then followed twelve years of steady growth, and in 1866 Louis Hillebrand and Daniel Wolf purchased each a share, and the name of the firm became Liebrich, Hillebrand & Wolf. Under its new name the advance of the business was rapid and sure. In 1870, Conrad Liebrich died, and his interest being purchased by the surviving partners, the firm has since been styled Hillebrand & Wolf. In January, 1871, it having become necessary to still further increase the premises, contiguous buildings, fronting on Sansom street, were obtained and added to the

manufactory. These buildings are similar to those facing on Eighth street, having a frontage of 22 and a depth of 115 feet. But even these were found insufficient to meet the demands of the trade; and so, in 1872, another structure was erected in the rear, in the direction of Chestnut street, to serve as a foundry and moulding shop. At present, therefore, the factory consists of five distinct buildings, the whole having the form of the letter L, and showing a tendency to develop into a T. In the base of the Eighth street premises are located the engine and boiler, the former of fifty and the latter of fifty-five horse power; and from this engine motive power is supplied through the whole factory, and also to three other establishments on Eighth street. There are now employed over 100 men. The locks turned out it is difficult to enumerate, but some idea may be formed when it is stated that the weight of each day's produce is over a ton and a half. Every description of lock is made, the staple being trunk locks, of which the firm claim to be the largest manufacturers in the country. Next come padlocks; then mortice locks, dead-latches, etc. Large quantities of trunk fittings, door-springs and keys are also manufactured; and the requisite tools and the smaller machinery are made on the premises. Nineteen different patents are owned by Hillebrand & Wolf. They are continually originating and producing new patterns; and it is to this constant variety that the firm attribute a great measure of their success. They have lately obtained a permanent contract to supply the Government with "Scandinavian" brass pad-locks.

LOUIS HILLEBRAND was born November 24th, 1834, in the city of Mannheim, State of Baden, Germany. Here he received his education in the public schools, and learned the trade of lock and machine making till 1851. In that year Conrad Liebrich visited Mannheim, and engaged Louis Hillebrand to accompany him to Philadelphia and become pattern maker in his lock manufactory. Louis Hillebrand remained with him ten years, during which time he became foreman. In 1861, he went into business for himself, still keeping a slight connection with Conrad Liebrich, making many patterns for him, till 1866, when he re-entered the business as a partner. At the commencement of the war, in 1861, he organized a company for home defence, styled the "Gymnast Zouaves," of which he was elected captain. Shortly after he formed another company for active service, one-third of it being composed of recruits from the "Gymnasts." Of this company also he was elected captain; and it was accepted as Company B, 23d Regiment of Pennsylvania Volunteer Infantry. He served two years, and then, being wounded, received his honorable discharge.

DANIEL WOLF was born June 24th, 1830, in the city of Goettheim, State of Bavaria, Germany. He received his education at the public schools, and at the age of sixteen accompanied his family to this country. Till 1852 he was employed by his uncle, Conrad Liebrich, and then he went into and carried on business for himself, as locksmith, for fourteen years, during which time he made many successful ventures in dry goods. In 1866, he became a partner in the firm of Liebrich, Hillebrand & Wolf.

JAMES W. COOPER & BROTHER, Manufacturers of Fancy Cabinet Wares, Philadelphia. In 1858, the senior partner of the present firm—then in the segar business—perceiving the great demand for fancy cabinet wares, which prior to that date had been chiefly imported from Germany and Switzerland, determined to try his skill in their production, believing that American labor could successfully compete with that of foreign lands. He accordingly rented a room, 15 by 28 feet, in Salem alley, and commenced operations, he himself being the only workman. During the first year he made goods to the value of $100, and these he literally gave away, finding by this mode of procedure that it was a most excellent plan of advertising, though certainly, at first sight, it did not appear a very encouraging prospect for the labor he had bestowed upon the new business. But he did not despair of ultimate success. By dint of indefatigable industry and perseverance he succeeded, and within eighteen months after the commencement of his enterprise his wares found a ready sale, and the demand for them had increased to such an extent that he was obliged to seek a larger building. He now removed to No. 1222 Heins street, where he erected a three-storied building, 18 by 30 feet, and placed therein all the necessary machinery, which was operated by an engine of twenty horse power, and where he now employed some fifteen hands. In less than two years he exploded the false idea that foreign skill and labor were superior to our own; and he has so revolutionized these notions that he has a large foreign demand, and his products are taken in preference to the imported article, it being acknowledged that for variety of design and excellence

of finish the American wares are superior to all others. His business throve apace, and after two years occupancy of this latter building he was obliged to enlarge it, adding three stories more and extending the edifice through to Pine street, making it 18 by 80 feet in dimensions; and his pay-roll increased proportionately, employment being given to fifty hands. In April, 1865, two four-storied buildings, Nos. 1239 and 1241 Pine street, were also secured and used for offices and ware-rooms. In 1867, he obtained possession of the premises Nos. 424, 426 and 428 South Thirteenth street, where his lumber yard and stables were now located. At this date he had 150 workmen in and about the several buildings. In 1871, he was obliged by his constantly increasing business to still further augment his workshops, and being unwilling to scatter his factories, finally secured a lot of land on Washington avenue, west of Seventeenth street, where he erected his present establishment. It has a frontage on the avenue of 143 feet, and runs through to Alta street, being 150 feet in depth. The buildings were completed finally in April, 1873, and the other buildings were abandoned. Prior to this removal, however, the senior partner associated with him his brother John, who in January, 1873, took charge of the business, while the former sailed for Cuba to recuperate his health. Two days after his departure the Pine street buildings were burned, and considerable loss sustained; but without any delay the damages were repaired, and in less than a fortnight the works were in good running order; nor did the senior partner learn of the disaster until his return home. This establishment consumes over a million feet of lumber annually, and its products during the same period are valued at over $250,000. The capital now invested is about $175,000, and it should be stated that this sum, together with the large amount expended upon and invested in the buildings formerly occupied, as well as at present used, has been derived exclusively from the profits of the business. The goods produced are sold all over the United States, and are largely exported to the Dominion of Canada, to South America, and to foreign lands. From 200 to 250 hands are employed in the works. The east wing is 25 feet square, two stories in height: the lower floor is the counting-room, and the upper contains the drafting and designing room; also the hardware department and a private office. In the west wing, the engine and boiler occupies the ground floor, and above this all the "machine carving" is carried on. The main building is five stories high, 50 by 100 feet. The first floor is the sawing and ripping room; the second floor is the turning shop; the third and fourth floors are used for putting together and finishing the cabinet wares; while in the upper story a large number of the most skilful hand carvers are constantly engaged. From the third story a bridge extends to the rear building, 25 by 143 feet, which contains the gilding and ornamental rooms, together with the packing and shipping departments. At the western end of this latter building are placed large and commodious stables. The lumber and other articles used in the manufactures are landed in the yard from the cars, by means of a siding and turn-outs from the Washington avenue branch of the Pennsylvania Railroad.

PITTSBURGH TAR CHEMICAL WORKS, Allegheny City, David Hostetter, Arnold Hertz, and Otto Wuth, Originators and Proprietors. This growing industry of western Pennsylvania was started in July, 1872. The factory is located on Rebecca street, adjoining the City Gas Works, and the business office is at No. 70 Fifth avenue, Pittsburgh. The capital invested in the works is about $60,000, and the products of the first year were valued at over $70,000. The enterprise has been very successful from the first, and the business is yearly increasing. About twenty hands are employed, under the supervision of Dr. Wuth, an experienced chemist. The manufactures include roofing cement, "dead" oil for impregnating purposes, varnish, rectified bensole, oil of myrbane, and carbolic acid. In the making of the two latter articles, especially carbolic acid, the works excel, their product differing from that of other domestic and foreign manufacture in the fact that it is in color pure white. The market for these goods is throughout the entire country, and they are also exported, to some considerable extent, to Europe. This establishment uses all the gas tar made in Pittsburgh and Allegheny City, besides a large amount obtained from the gas works of large cities in the neighboring States. The annual products are now valued at $125,000.

DAVID HOSTETTER, M. D., is best known as the manufacturer of a popular Bitters bearing his name. A full sketch of his life and principal business appears elsewhere in this work.

ARNOLD HERTZ, M. D., the business man of the Tar Chemical Works, was born in the former Duchy of Nassau, now a portion of the empire of

Germany, in 1837. For two years he studied with Dr. Fresenius, at Wiesbaden, from whence he entered the Polytechnic School at Carlsruhe, and afterwards pursued a course of mining and engineering studies at Clausthal and Freiberg. In 1862, he emigrated to the United States, and in 1863, settled in Pittsburgh, where he has since resided. He is proprietor of the Fairview Oil Refinery.

OTTO WUTH, M. D., Chemist, was born at Wiesbaden, on the Rhine, in December, 1833. He is a graduate of the Heidelberg University. After leaving that institution he studied for two years with Dr. Remegius Fresenius, of Wiesbaden. He then came to America, and almost immediately received the appointment of Chemist in the works of the Pennsylvania Salt Manufacturing Company, at Natrona, Pennsylvania. With this company he remained for five years. He then removed to Pittsburgh, where he has since resided, engaged in his profession as a chemist, in which his high rank is universally acknowledged, especially in cases of poisoning, where much depends upon a careful analysis. He is widely known among the iron and steel manufacturers of the State, and is a member of the firm of Bolton, Myers & Co., of the Canton (Ohio) Steel Works. He belongs to that class of Germans known as "Free Thinkers," is a member of no church, and a liberal Republican in politics.

ARBUCLES & CO., Wholesale Grocers and Coffee Roasters, Pittsburgh. This fine establishment is situated on Liberty street, where the building occupies a frontage of 86 feet, connected by an iron bridge, extending across an alley way in the rear, with a factory 50 by 70 feet. The business was founded in 1858, by McDonald & Arbucles. They carried on the general grocery and jobbing business until 1864, when they introduced the roasting of coffee and the putting up of spices. They claim to be the only house in the country which furnishes the articles which they supply perfectly pure and free from adulteration. In their factory is the steam engine which furnishes the motive power for the coffee roasters and grinders, and also for the machinery necessary in preparing and packing the spices for the market. The Pittsburgh establishment produces daily 200 bags of coffee, which supplies only the demands of their Western customers. To meet the wants of the East they have located a branch house in New York city, Nos. 56, 58, and 60 Front street. The success which has attended the business life of this firm is full proof of their right to claim first rank for the purity of their goods.

CHARLES ARBUCLES, the senior of this firm, was born in Pittsburgh in 1834. He entered into business, with his uncle, in 1858, and afterwards established himself as above. His brother, who manages the New York branch, was also born in Pittsburgh, and is a member of the firm.

OLD SHARPSVILLE FURNACE, owned and conducted by the sons of the late James Pierce, is situated on a tract of land comprising twenty acres, in the western portion of the borough of Sharpsville, Mercer county. The works were built (for a coke and charcoal furnace, using native ore) in 1846, by Vincent, Himrod & McClure, and were called "The Blanche Furnace." They, at that time, made 1200 tons of iron yearly, and employed fifteen hands. About 1854, the property came into the hands of D. & J. P. Agnew, by whom the works were run for two years. They were then purchased by James Pierce, who, in 1859, put them in blast, using semi-bituminous block coal and Lake Superior ore, and in this way they were conducted until the fall of 1873. Since that date the furnace has been rebuilt and put in complete and improved order, and it now has a nominal capacity of 7500 tons per annum, though 8000 tons have been made under favorable circumstances. The requisite force of men is about thirty. The buildings are: stock house 60 by 100 feet, casting house 48 by 70 feet, engine house 35 by 40 feet, and in the vicinity of these are five single and seven double frame tenement houses, with iron and slate roofs. The original dimensions of the furnace were 10 feet bosh and 48 feet high; this has been increased at present to 11 feet bosh. The annual consumption of material is: coal, 16,000 tons; ore, 11,000 tons; limestone, 2600 tons.

THE HICKORY FURNACES, owned by the Mount Hickory Iron Company, composed of James Pierce (lately deceased) and W. F. Scott, of Erie, are located on 20 acres of land in the northeastern section of Sharpsville. They were erected and put in blast in 1868, and run constantly until the spring of 1874. They are each 12 feet bosh and 50 feet high, with an aggregate capacity for 18,000 tons per annum. The buildings are: a frame stock house 66 by 120 feet, brick casting house 48 by 150

feet, brick engine house 25 by 45 feet, and eight double and four single tenant houses. The material used during the year 1873 was: ore, 21,800 tons; limestone, 5000 tons; coal, 33,000 tons.

THE SHARPSVILLE FOUNDRY AND MACHINE SHOP was commenced, in 1868, by William Geddes, William Harnsworth, and James Pierce, for the manufacture of rolling mill, blast furnace, and coal bank castings and machinery in general. The works are located on Shenango street, and occupy about one acre of ground. The buildings are a frame machine shop 90 by 32 feet, two stories high, and a foundry 45 by 68 feet, with a wing 20 by 45 feet. The machinery, which consists of three lathes, one drill press, one planer, and a bolt cutter, is run by an engine of thirty horse power. The foundry has a capacity for melting 125 tons per month, and the entire works employ, when engaged to their full capacity, about thirty-five men. In October, 1869, Daniel Eagan was admitted into the firm, which, from that date, was styled Geddes, Pierce & Co. In 1872, John Young became a partner, and the business from that date to the present has been conducted under the firm title of Geddes, Young & Co.

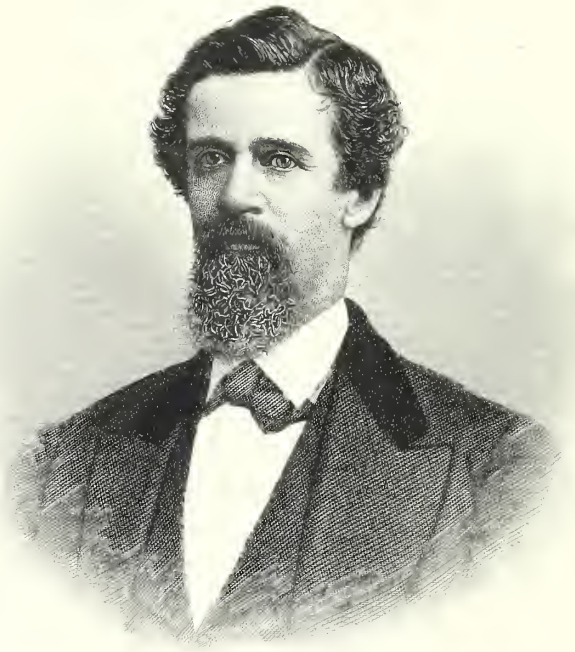
THE DOUGLAS FURNACES occupy about eleven acres of land in the west end of Sharpsville, and were erected by Pierce & Kelly; No. 1 Furnace in 1870, and No. 2 in 1872. The firm is composed of Jonas J. Pierce, George D. Kelly, James Pierce, and Wallace Pierce. No. 1 Furnace, thirteen feet bosh and fifty feet high, was put into blast in February, 1871, and blown out in the fall of 1873. No. 2, which is fifteen feet bosh and fifty feet high, went into blast in December, 1872, and was blown out in the spring of 1874. These furnaces have an aggregate capacity of 20,000 tons per annum, and require a force of fifty men. The buildings are, two casting houses, each 48 by 80 feet, an engine-house, 25 by 40 feet, and a stock house, 60 by 20 feet, all of brick, and are surrounded by four double, and four single, frame tenement houses. The works are in every respect among the finest and most complete furnaces in the valley. The motive power is furnished by the McIntosh & Hemphill vertical engines, with 72 inch blast and 32 inch steam cylinders, and 48 inch stops. The material used annually has been, ore, 33,000 tons, coal, 40,000 tons, and limestone, 8300 tons. Being located on the line of the Pittsburgh & Erie Railroad, with which they are connected by switches and side tracks, these works enjoy shipping facilities which very materially lessen their expenses and make a discount on the price of their product.

FORT PITT STEAM BOILER WORKS, Pittsburgh, derive their name from the fact that within a few feet of their doors stood the once famous Fort Pitt of Revolutionary interest. Business is prosecuted under the firm name of D. W. C. Carroll & Co., the company being Robert G. Jones. The concern was established in 1840, and in 1859 was managed by Carroll & Snyder, which firm was dissolved in 1872, when Robert G. Jones, formerly principal book-keeper, became associated in partnership with his employer, and the present firm was organized. The manufactures consist of steam boilers of all kinds, blast furnaces, stacks, pipes, condensers, sugar pans, mill stacks, sheet-iron work, railroad car oil tanks, and large iron tanks for the storing of crude petroleum and its products. These tanks enter largely into the business done by the Fort Pitt Works, and to their construction especial time and attention are devoted; during the past eighteen months the partners have erected in the Oil Regions of Pennsylvania, and in the adjacent country, over 1,000,000 barrels of iron tankage. The buildings, occupying one square of ground, are entirely under cover, are constructed of brick, and have a frontage on Second avenue of 125 feet, on Third avenue also of 125 feet, and on Short street of 180 feet. The works contain the finest machinery of its kind in the country; notably, index punches and shears, which travel and punch sixty holes per minute, steam riveters, angle benders, shapers, and self-feeding punches. It was in their works that the first large iron oil tank was built, having a capacity of 5000 barrels; since that time millions of barrels of iron tankage have been put up successfully by them, and to-day these monuments of iron dot the oil regions in every section, and testify to the talent and enterprise of their builders. Their steam boilers are largely used by the Western and Southern lines of steamers, and accidents resulting from imperfect workmanship in their manufactures have never yet been laid to their charge. All the material used in the works primarily undergoes a rigid examination by an inspector, whose duty it is to "pass" nothing but what is flawless and perfect; especially is the plate iron subjected to severe tests, and the slightest fault suffices to condemn it utterly. The general management of the establishment is intrusted to David Rogers, Nicholas Werle, and John Blue,

GALAXY PUB. CO. PITT.

Fort Pitt Steam Boiler Works, D. W. C. Carroll & Co., Proprietors

LIBERTY & LIBERTY STS. 2ND & 3RD AVENUES PITTSBURGH, PA.



Galaxy Pub. Co. Philadelphia

W. C. Carroll

and is sub-divided into three parts, viz.: tank, boiler, and sheet-iron departments. The surprising success of the Fort Pitt Steam Boiler Works is chiefly attributed to the remarkable accuracy evinced in every point and detail of their products.

D. W. C. CARROLL, the senior member of the firm, was born in Pittsburgh, and was the recipient of a practical and thorough common school education. After serving his term of apprenticeship under Stackhouse & Nelson, the well-known engine builders of Pittsburgh, the latter portion of his time in the works of which he is now principal proprietor, he became an engineer, a calling to which he was strongly attracted, and for several years was employed on some of the largest and finest steam packets plying to and fro on the Ohio and Mississippi rivers. He subsequently, in 1859, became one of the firm of Carroll & Snyder, and was soon prosperously engaged in a thriving and widening trade. Thenceforward, as above related, he met with marked success, and at the present time is one of the most extensive and influential manufacturers in the country. His mother still lives in Pittsburgh in the full enjoyment of all her faculties. His father, James Carroll, was identified with most of the large machine works of the city and was a man of exemplary habits; he died some three years since, at the age of seventy-four. It is such men as D. W. C. Carroll who, having from the first their own way to make, give tone to the manufacturing pursuits, and who, looking back on years of honest toil, may truthfully say they are the architects of their own fortunes.

ROBERT G. JONES is noted for his business tact and talent, and has brought to the firm various qualifications of no secondary nature; he also was born in Pittsburgh, and there received a good classical education.

THE DICKSON MANUFACTURING COMPANY, Scranton and Wilkesbarre, was organized in 1856, and to-day is one of the largest manufacturing establishments in the country, combining probably a greater variety of manufacturing interests than any one other organization in the United States. The partners began operations under the name of Dickson & Co., and were engaged in constructing stationary engines, boilers, and machinery for mining purposes generally. A foundry and machine shop, the original extent of the works, were put in operation May 1st, 1856, and in that year they contracted for and built the engines and boilers that were used by the Delaware & Hudson Canal Company, in constructing their new road over Moosic Mountain; the work gave such satisfaction that their reputation was at once established, and thenceforward their machinery was sought after for all mining and kindred purposes, and it may be justly asserted that the perfection to which they have brought this class of machinery has placed the region where their works are established far in advance of all other sections in the economy of mining and preparing coal and other natural products. The panic of 1857 they weathered successfully, and to such an extent did their business subsequently increase that, in 1862, they obtained a charter from the Legislature, under the name and style of the Dickson Manufacturing Company, with a capital stock of $200,000. Upon the origination of the enterprise, in 1856, they employed seventy-five hands, and possessed as a capital about $50,000. That force increased from time to time as the requirements of the business demanded, and, in 1862, amounted to three hundred and fifty regular employés. Since its organization they have increased their capital to $600,000, and have the privilege of making it $1,000,000, should that amount be needed. In 1862, they purchased the Cliff Works, located at Cliff and High streets, in Scranton, near the Delaware, Lackawanna & Western Railroad. They then added to their business the manufacture of cars and locomotives. Greatly enlarging their works, and adding the most improved requisite machinery, they rapidly acquired a wide reputation as locomotive builders, and at the present time a large number of their engines can be found on the majority of the leading railroads of the country. In 1864, a planing mill, adjoining the Cliff Works, was purchased, and to their already extensive business was added the manufacture of doors, sashes, blinds, etc. In that department they consume annually enormous quantities of lumber, and their specimens of work testify amply to the skill of their workmen, and to the admirable executive powers of the organization controlling them. In 1866, the foundry and machine shops of Lanning & Marshall, at Wilkesbarre, were purchased, and a branch established there by the Dickson Manufacturing Company. Here they manufacture car wheels and axles; they possess also a wheel foundry at Carbondale, which has the capacity of 100 wheels per diem. At present the works in Scranton consist of a foundry, machine shop, six smith shops, boiler shop, locomotive shops, car shops, planing mill, and sash, door, etc., factory. In all of these

departments they are prepared to manufacture the most extensive articles connected with their respective businesses that may be required. The forge contains three steam hammers, and they have made here forgings as heavy as fifteen inches in diameter, and in the foundry made eastings over twenty tons in weight. They have in constant use eight stationary engines. They are now occupied in manufacturing heavy blowing engines and steam pumps, and have also constructed marine engines, but their main business is the manufacture of all classes of mining machinery, and cars and locomotives. Their capacity for building is five locomotives per month and twelve coal cars per diem, in connection with the other machinery and articles continually turned out. Their works in Scranton alone cover an area of six acres, and, when all the departments are in operation, they furnish employment to over 1200 men, thus affording direct means of subsistence to at least 5000 persons. The works are managed by an able corps of officers; the President is George L. Dickson; Vice-President, J. C. Phelps; Secretary and Treasurer, W. H. Perkins; General Superintendent, W. B. Culver; Superintendent of the Locomotive Department, John Swift; Agent in charge of the Wilkesbarre Branch, J. S. Law. The Carbondale foundry is carried on under the name of Van Bergen & Co.

GEORGE L. DICKSON was born in Scotland, in 1830, and in 1832 came to the United States; in 1834, his family settled in the western section of Pennsylvania. Since their foundation, he has been prominently identified with the works of which he is now the President, and prior to 1860 had charge of the Carbondale works, but on the retirement of his brother, Thomas Dickson, who resigned the presidency on his election as President of the Delaware & Hudson Canal Company and Railroad, he was called to Scranton to succeed him.

MOORE'S WESTMORELAND DISTILLERY, Thomas Moore, Founder and Proprietor, is situated at Moore's Station, on the Pittsburgh & Connellsville Railroad, twenty-seven miles from Pittsburgh, on the banks of the Youghiogheny river. The proprietor has been engaged in this business all his life, but it was only in 1870 that he moved to his present location and founded the place that bears his name. The village is a cluster of about forty brick dwellings and the distillery and store. When running at its fullest capacity, the distillery turns out 100 barrels of whiskey per day of ten hours. It is the largest place of the kind west of the Alleghenies, employing in busy times about 125 men. The best brand of rye whiskey is here made, and it is sold principally in the Philadelphia and New York markets, where its reputation is second to none. It is by this brand and a remarkably fine article of Bourbon whiskey that Thomas Moore has established his great reputation as a distiller. The village at Moore's Station occupies 137 acres of ground, valued at $500 per acre. The buildings are worth $200,000, and are built of brick manufactured in the village, the proprietor owning a yard and kiln and carrying on the business there. He makes his residence in the village, and has reason to feel a pride in being the founder and supporter of so prosperous a little place. He is also the President of the great Youghiogheny Coal Hollow Coal Company, of which an account is given elsewhere in this volume, and is connected with several other enterprises of note. In fact, he is a moving power in the development of the exhaustless resources of western Pennsylvania. The Ocean Mines at this place are owned by him, and the miners live in the village. Great interest is taken by him in the welfare of these men; and, convinced of the benefits accruing to a working man from a sense of ownership in his home, he holds out liberal inducements to them to become purchasers of their cottages. He is entitled on this account to high consideration, his benefactions being calculated to increase rather than diminish the self-respect of those benefited.

H. M. DALY, agent for the above distillery in the Eastern markets, maintains an office in Front street, Philadelphia. In 1860, he was selected by Thomas Moore, Joseph S. Finch & Co. and the proprietors of other distilleries as agent for the wholesaling of their whiskeys in the Eastern markets. The trade, once begun, rapidly grew in importance until it was found necessary to establish an office at some central point. Philadelphia was chosen as the most advantageous location, and premises were secured on Front street. The sales now reach extensive proportions. From his principals he receives about two hundred barrels of fine whiskey a day. These goods are known all over the country, and larger sales are claimed for them than for any other brands. The average sales in Philadelphia of Moore's and Daly's whiskeys combined reach about a million dollars per annum. His storehouse in Front street is capable of holding ten thousand barrels, with unusual conveniences for

SCRANTON

WILKESBARRE

GENERAL WORKS AND OFFICE SCRANTON PA

Dickson Manufacturing Company.

SCRANTON AND WILKESBARRE, PA

loading and unloading, having two fronts, one on Dock street and the other on Front. The high character of the whiskeys of this establishment is acknowledged throughout the country, as is unmistakably evidenced by the large patronage they command.

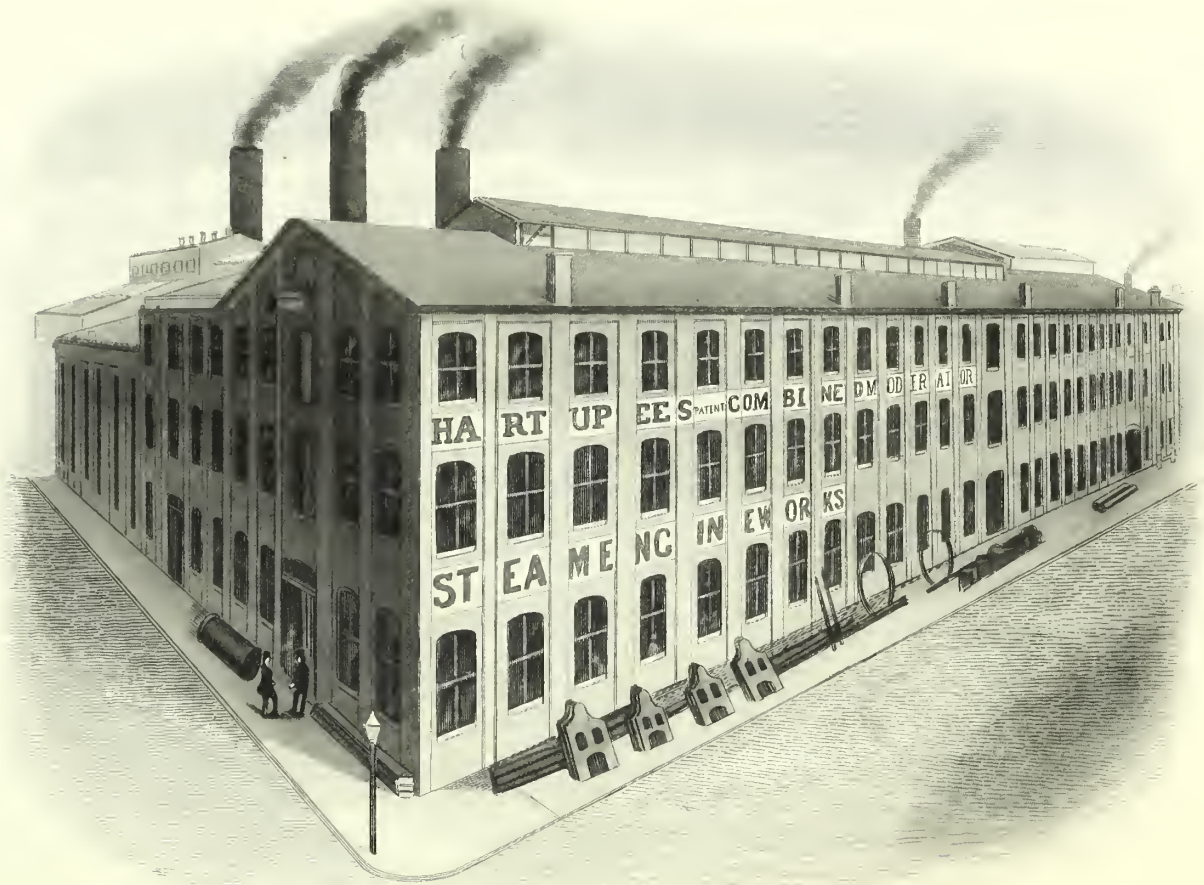
ABRAHAM POTT, Coal Miner, was born at Oley Forge, Berks county, Pennsylvania, May 20th, 1799. He is a son of John Pott, the founder of Pottsville. The family is of German origin, and springs from two brothers who came to this country in 1732. John Pott was one of a large family, all of whom became residents of Schuylkill county. About the year 1804, he purchased the "Physick Tract," upon which Pottsville is now built, beside other large parcels of land, including the site of the present town of Port Carbon, his intention being to engage in the manufacture of charcoal pig-iron. In 1806, he erected a furnace in that part of Pottsville now known as the "Orchard," at the northwest corner of Coal and Mauch Chunk streets. A forge was built shortly afterwards near the present location of the Pioneer Furnace. The ores used were bog ore, procured in the neighborhood, and ball ore, gathered from the surface of the ground, the latter being the richest in quality. These remained in operation until 1827, when John Pott, the elder, died. It was demolished to make room for the canal basin. The Pott family moved to the furnace in 1810, at the time the Centre turnpike was approaching completion. The present site of Pottsville was in a state of nature, except a log house with a half acre of cleared ground. The iron, as run from the furnace, was cast into hollow ware and stoves, and traded to farmers, generally from the Susquehanna, for grain, etc. This was ground in the "Shollenberger Mill," which John Potts erected, and in digging for the foundation the outcrops of coal veins were struck, but this was not regarded as of any value. One David Berlin, a blacksmith, however, conceived the idea that it might be used in a blacksmith's fire, and did so use it for four months during the erection of the mill. He built his fire with charcoal. Some others followed his example. It was not until 1816 that the method of burning it in stoves and grates was understood, and then Abraham Pott, who slept in the mill, discovered it by accident. On a bitterly cold night during that winter he built a roaring fire with hickory staves, and on this threw some small pieces of the anthracite and retired to rest, but was awakened about 4 A. M. by the intense heat, and found the stove red hot. He was much alarmed and ran for his father, who came; an investigation was made, and the true mode of using the coal in small pieces, and not in the large lump, was made apparent. At this time the Schuylkill Canal was being built, but it was designed for the benefit of the lumber trade. Coal was taken to Philadelphia in 1821, on flats, by Abraham Pott; also in 1822 and 1823, two or three trips being made each year. The first boat built for the canal was by the company called the "Pioneer." Abraham Pott shortly after built the "Stephen Decatur." They each carried about twenty-eight tons. In 1824, they started on their first trip to Philadelphia, but only proceeded as far as Reading. In 1821, the speculators in land began to arrive, and during this year Abraham Pott started mining coal from the Salem and Tunnel veins, continued it for four years, and then operated and worked coal from Guinea Hill. In 1826, he took a contract from the North American Coal Company to deliver coal for $1.70 per ton into boats at the mouth of Mill creek. The canal at this time was just being completed from Mount Carbon to Port Carbon. He had been a diligent reader of William Strickland's *Reports on English Railways*, and appreciated the fact that coal could be moved cheaper by this mode than by wagons to the canal. Though he had never seen a railway, yet from these reports he undertook to construct one, devising even the car to run on the road, and the style has never been altered. This was the first railway laid down in Schuylkill county, and was of 40 inch gauge. The building of the railway necessitated the erection of a schute or bin to hold the coal, and this he also constructed. When the canal was finished, the directors of the company visited the work, and were amazed to see a single horse drawing a train of eight or ten loaded cars with ease, and the ingenious device for dumping the coal into the bin. The projector was proud of his work, and advised the directors to enlarge their canal, and at the next session of the Legislature to have railroad privileges added to their charter; but they treated the matter as chimerical. In 1829, he went into partnership with Burd Patterson in the mining of coal on the Mayfield tract, and was also connected with him in his early experiments in the manufacture of pig-iron with anthracite coal. Rev. Dr. Geisenheimer believed in its practicability, and he with Abraham Pott succeeded at the Valley Furnace in manufacturing some thirty pigs, but the machinery of the furnace was defective and only one casting was made; but to Rev. Dr. Geisenheimer and his

coadjutor is due the credit of having made the first anthracite pig-metal. The latter is still living, a hale, hearty old man, universally loved and esteemed. He is almost the last of the old pioneers of this region, and, on account of his long practical experience, his judgment as to location of coal veins is still highly regarded. Possessed of pleasant manners and a memory singularly accurate, many a pleasant hour is passed in his company by the young men of the present generation, in learning the history of the past from one who part of that history was.

THE HARTUPEE COMPOUND STEAM ENGINE FACTORY, Pittsburgh, extending from First avenue to Second avenue and from Short street to Red street, covering about one and a-half acres, filling a square, and employing about 150 men, while capable of accommodating double that number, was founded in 1845, by Andrew Hartupee, for the manufacture of steam engines, and for a period of one year its business was prosecuted under the firm-name of White, Hartupee & Co. That firm was then dissolved, and James Reese, John Morrow and James Hutchison were admitted to an interest in its conduct, the association assuming the title of Reese, Hartupee & Co., and continuing in existence for about five years. James Reese disposing of his interest in the concern, the firm was reorganized as Haigh, Hartupee & Co., the first-mentioned partner having been an original partner and the "Co." in White, Hartupee & Co. Affairs were thus conducted for six or seven years, when, Haigh selling out his interest, the firm became Hartupee & Co., the "Co." being John Morrow, and prosecuted its business uninterruptedly until 1861. At that date Andrew Hartupee became the owner, by purchase, of his partner's interest in the establishment, and business was continued under the name of A. Hartupee only. In the latter part of 1861, he associated with him in partnership A. W. Foster and Samuel Hartman, but at the expiration of the following year purchased their interests and again became sole manager and proprietor. He is the holder of several valuable patents on the steam engine, and also in nut machines. His most notable improvement on the steam engine is a system of compounding possessing many needed and highly useful advantages. Constructed on this principle he has built the largest engines that have ever been put on the Mississippi, and the most successful among the steamers furnished by him are the "Great Republic," built in 1864, of 3000 tons burthen, 300 feet long, and costing $317,000; the "Dictator," "John F. Tolly," "Henry C. Yeager" and the "Quickstep." For the South American trade he has constructed three iron boats, furnished with his engines, and in 1862-'63 he built for the Government two iron boats, fitted with his engines, not, however, on the compound system, that invention not having then been perfected. Prior to this time, in 1861, he took from the Government a contract to build two pair of engines and deliver them in St. Louis "within forty days, under penalty of $100 per day" for each day beyond the allotted period, and this contract was satisfactorily concluded within thirty days. In 1868, his establishment was destroyed by fire, but was speedily rebuilt, and is now the most extensive shop west of the mountains. In 1873, he received from the city of Pittsburgh a contract for building two pair of the largest engines for water works ever built in the United States; one of these is constructed on the compound principle; the largest cylinder is 106 inches, and the smallest 60 inches in diameter, with a 14 feet stroke; they will throw water to a height of 360 feet, while the combined capacity per diem is 50,000,000 gallons. The "John A. Wood," constructed by him, possesses the most powerful engines that have ever been placed on a towboat on the Western waters, and are among the most successful of his engines.

ANDREW HARTUPEE was born in Pittsburgh, in 1822, and was educated in the common schools of his native place. When in his fifteenth year he learned his trade with John Arthurs, a noted engine builder (now deceased), and in 1845 commenced business operations on his own responsibility, since which time he has met with great prosperity and attained an enviable reputation in the business circles of Pennsylvania.

COOPES BROTHER & DARLINGTON, Wheel Manufacturers, West Chester.—This extensive business was initiated in 1868, by the manufacture of spokes only, but in the following year the manufacture of felloes, shafts and bent work for carriages was successfully conjoined with the existing industry, the commercial relations of the firm were widely extended and its resources more fully developed. In January, 1873, the complete manufacture of wheels was inaugurated, the capital invested



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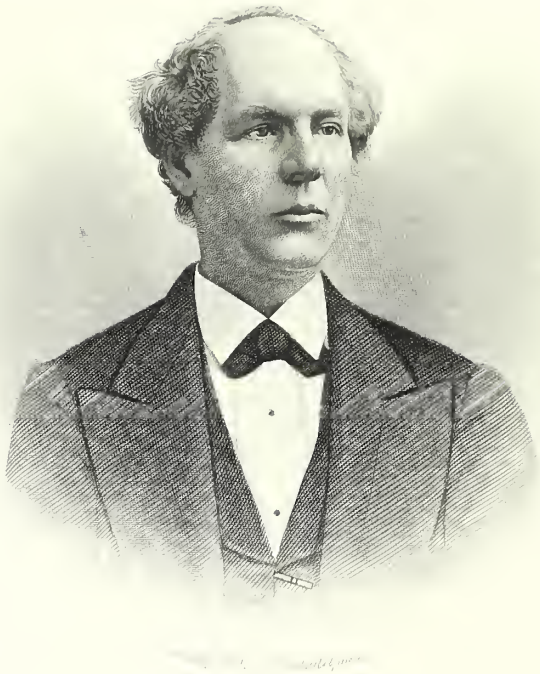


A. Hardcastle

amounting to the sum of about $20,000. In the spoke manufactory but ten hands were kept in constant employ, while at the present time the number of employés furnished with regular occupation amounts to upward of 100 men; of these seventy-five are employed in the mill, the remainder being variously engaged in different occupations on needed material. The value of their product for the first year may be estimated at about $18,000. At the opening of their trade, their market was confined principally to Philadelphia, Wilmington and New York, and during the first six months the sales amounted to about $4000. Bent stuff was then added to the list of their products, and thus engaged they continued to enlarge their commercial boundaries with increasing success and reputation, until it was found advantageous to construct completed wheels, a manufacture which has since been ably and remuneratively prosecuted. The greater portion of the raw material is furnished by Chester and the adjacent counties, a region noted for the abundance and excellence of its hickory wood. Some material is also forwarded to them from Ohio; that also being an article of desirable quality. The value of their annual product at the present time is about $120,000, and with each succeeding year that value increases in a marked degree. The works are located on East Market street, adjoining the depot of the Philadelphia & West Chester Railroad, and have a frontage on the above-named street of about 180 feet, with a depth of 500 feet, occupying an area of about two blocks. The eastern portion of the structure is a substantial brick building three stories in height, with a spacious loft adapted for drying purposes. The manufacture of wheels is carried on principally in this section of the works. Convenient railroads adjoin the premises, and the erection of another commodious building is in contemplation, and will (1874) probably be finished at an early date. In the commencement of their enterprise, the partners occupied but a one-third portion of a two-storied building 100 by 36 feet, with a boiler and engine room attached; but eighteen months later used the entire structure. The commodious brick building was erected in 1872, and January 1st, 1873, they removed thither and prosecuted their business with increased vigor and enterprise. The most approved machinery obtainable is used in their various departments, and their workmen are recognized as thorough and efficient artisans. Their arrangement for kiln drying has a capacity of 50,000 spokes. Their present capital is about $90,000, and their goods find a universal market, while the trade with California is extensive and highly profitable. At the Vienna Exposition they were awarded the premium for wheels, and their products are favorably known throughout Europe, and are in extensive demand. The usual standard for wheels is adopted, and about twenty-five sets of wheels per diem are turned out. 2782 sets were made the first year, and during the first six months of 1874 over 2000 sets. The members of the firm are both natives and residents of West Chester. Mr. Darlington attends to the financial department; W. Hoopes, the senior partner, an able mechanic, supervises the general practical affairs; Darlington Hoopes fills the onerous position of overseer and superintendent; and Thomas Hoopes, an unerring judge of material, purchases the stock.

YOUGHIOGHENY COAL HOLLOW COAL COMPANY, Pittsburgh. Thomas Moore, President; William Moore, Secretary and Treasurer. This is one of the most extensive companies engaged in the mining and shipping of coal in western Pennsylvania. It was organized and commenced operations in 1864, with a capital stock of $500,000. One thousand acres were purchased in Westmoreland county, at a place known as Shaner's Station, on the Pittsburgh & Connellsville Railroad, twenty-four miles from Pittsburgh, and since that time quite a village has sprung up in that vicinity, consisting of about fifty dwellings, a large hotel and several stores. The miners—about 300—are kept constantly employed. The coal mined here is nearly all shipped to companies in the Eastern cities, to be used in the manufacture of gas, it being considered a very superior article for that purpose, and also highly valued for the excellent article of coke which it produces. These two qualities create a constant demand for the coal, and at the highest market value. The company is now in a very flourishing condition, and its business is yearly increasing. In 1874, the amount of coal mined and shipped to the seaboard was about 100,000 tons, valued at the place of shipment at $600,000. Of this quantity 30,000 tons were sent to the Boston Gas Company, 10,000 tons to the Washington, District of Columbia, Gas Company, besides innumerable smaller shipments, all of which brought a higher price per ton than any other coal in the market. Its superior gas and coke-making qualities commend it at once upon trial, and the demand constantly exceeds the supply.

THOMAS MOORE, the Founder and President

of the company, was born at Mount Joy, Lancaster county, Pennsylvania, in 1818. He removed to Pittsburgh when a boy, and, having great business energy and a keen zest for speculation, he soon became engaged in enterprises of large extent. The immense whiskey distillery, of which he is the proprietor, situated at Moore's Station, Pennsylvania, is described elsewhere in this volume. For many years he has been more or less interested in the coal business, and his knowledge of the resources of the coal regions induced him to project the great work just described; and it is due to his sagacity and good management that it is now one of the foremost of the great mining enterprises of western Pennsylvania.

WILLIAM MOORE, Secretary and Treasurer of the company, is a brother of the President, and in addition to the duties incident upon these offices, attends to a large coal business; in that line he is a prominent and highly respected merchant of Pittsburgh.

CUNNINGHAM & CO.'S FOUNDRY AND MACHINE SHOPS, New Castle, are located on Main street. The firm is at present composed of R. W. Cunningham, R. C. Dunlap, J. D. Bryson, and J. H. Hartsuff. The works were originally started in 1839, by the present senior partner, who, until within the last ten years, conducted them as sole proprietor. They were at first used as a foundry, manufacturing stove castings, mill machinery, etc., and doing the general business of a country foundry, and giving employment to about twenty hands. The buildings were greatly enlarged in 1851, and after the admission into the firm, at different dates, of the junior members, the business was considerably increased. The foundry is now 50 by 120 feet, and the stove shop 22 by 90 feet, both built of brick and two stories high. There are also two machine shops, each three stories high—one of brick, 40 by 75 feet, and one of frame, 40 by 60 feet. The machinery in every department is of the most approved pattern, and the producing capacity of the establishment has been so much extended that at present its manufactures consist of water-wheels, rolls, rolling, grist and saw-mill machinery, hot-blast castings, steam engines, car wheels, stoves, and many other articles known to the trade. A specialty of these works is the making of "Bryson's Turret Case Turbine Water-Wheels," which, in common with all the other machinery turned out by this firm, have a wide and most excellent reputation. The entire establishment is in first-class running order, and though not at present employed to its full capacity, it requires the constant labor of forty employés to meet, even in these dull times, the demands of its regular trade.

JAMES A. FOSTER, Manufacturer of Artificial Limbs, was born in the town of Stockholm, county of St. Lawrence, New York, November 27th, 1829. His father, a go-ahead, hard-working man, was a native of Vermont, but emigrated to New York in the pioneer days of St. Lawrence county, purchased a small farm, and erected a saw-mill. Young Foster's boyhood life had little to make it memorable. He attended district school, helped on the farm and about the mill, and his leisure hours were spent in constructing dams across creeks, building water-wheels, and planning improvements in the machinery of the mill, which were to be carried out by his own hands in after years. His father early remarked the boy's skill and ingenuity, and, unlike many fathers, encouraged them. When nineteen years of age James A. left home to carve out his own fortune; going to the town of Moriah, Essex county, New York, to learn the millwright's trade with Putnam Brothers. Before he had completed his second year at the business, his father died (1850), and the son was called home to take possession of the mill and farm and care for the family. The mill was rebuilt, the farm put in order, and the young man began to push business. He engaged in lumbering, took contracts to build houses, mills and barns, and was rapidly acquiring a large and lucrative business, when misfortune came. A year before returning home he had fallen lame, caused by a white swelling in the knee, and after about five years of hard work this lameness increased to such a degree that he was obliged to give up business, sell out, and commence doctoring. From 1855 to 1860, he was in the hands of the doctors most of the time, and finally, despairing of ever being cured, he permitted them to amputate the leg. Now came the turning point in his life. There were manufacturers of artificial limbs in those days, and after getting off his bed he cast around to replace his lost limb with the next best thing to bone and flesh. He discovered that no manufacturer had yet succeeded in producing a perfect artificial limb. Some were badly shaped; others out of proportion; others imperfect in joints or finish. "Why not make something better?" Mr. Foster asked himself, and then answered, "I can and will."

And he did. He manufactured an artificial limb which has since been patented under the name of "Foster's Patent Union Artificial Leg." It was a better leg than he could buy, but it lacked finish, and so he went to Buffalo and served a short apprenticeship with G. W. Hall. After learning all that could be learned there, he visited other manufactories, to see if there was not something more that could be gained from them. He arrived in Detroit in November, 1864. He had no capital but his skill, no friend but a stout heart; but, having faith that real merit would soon make his goods known, he opened a small manufactory. He prospered from the start. Patents were granted him for his inventions, and scarcely three years had gone by when the demand for his goods warranted the establishment of a branch manufactory in Cincinnati. Two years later he came to Philadelphia and started another manufactory, which is located at No. 1013 Chestnut street. His business affairs are now so arranged that persons in want of artificial arms or legs can reach the factories without too much expense, and have the limbs adjusted to fit. After opening the manufactory in Philadelphia he was authorized by the Surgeon-General at Washington to furnish limbs to disabled soldiers, and thousands of the crippled boys in blue have by him been made almost as good as new again. He has succeeded beyond his most sanguine expectations, and the great secret of his success lies in the care which is bestowed on the manufacture of goods. His aim is to turn out the very best, and his patients, scattered from ocean to ocean, are his warmest friends and best wishers. He received but a limited education, had a hard battle with misfortune, and only his stern determination and iron will could have elevated him to the high and influential position he now occupies among the leading manufacturers of the United States.

JOHN LANG'S MANUFACTORY OF ROOFING FELT is located at the northwest corner of Vine and Twenty-fourth streets, Philadelphia, and is the largest of its kind in the city. It commenced operations in June, 1873, but ceased for a short time after the financial panic of September, in that year, had unsettled the market. The premises measure 76 by 112 feet to the Port Wardens' line on the Schuylkill river. On the south part of the lot fronting on Twenty-fourth street is a three story brick building 30 by 100 feet, originally used as a distillery, but which has been adapted to its present purposes by the occupant, and which affords ample space for all the operations carried on therein. On the northwest end is a large two story frame used for storage purposes, and there is also a two story enclosure to the steam boilers. The stock consumed weekly averages sixteen tons of woollen rags, refuse paper and mill waste or "dust," and when received is hoisted by steam power from the street to the third story of the building, where, after sorting, it is cut by a machine operated by steam power. The material now descends to the second floor, where, in the three "beating engines," supplied with water from the river, it is ground into pulp ready for the machine. Again descending to the first or ground floor, it is admitted into a large vat, whence it is pumped on the machine, the requisite flow being regulated to suit the thickness of the paper. The "sheet" is formed in a vat on a cylinder, 24 inches in diameter and 48 inches long, from which the "wet felt" or blanket "conches" it off and carries it between a pair of (first) press rolls; it next passes through the (second) press rolls, which has also its own proper felt. From this point the sheet passes over ten "driers," each 28 inches in diameter, and all heated by steam. When the last of these is reached it is wound up on a reel, and again from the latter run off and wound in rolls, averaging 100 pounds weight. The felt can be made of any prescribed width and thickness; the article most generally manufactured averages fifteen square feet to the pound. The yield of paper is about twelve tons per week when the mill is running on full time. The trade is not only local, but considerable quantities are shipped to New York and vicinity. There are from eight to twelve hands employed each twelve hours. The motive power is furnished by two steam engines; one of seventy horse power drives the rag cutter, the three beating engines, the water pumps and hoisting machinery; the other of fifteen horse propels the paper machine itself. The "driers" are heated by the waste steam from the boilers.

JOHN LANG was born at Laufen, in the kingdom of Wirtemberg, Germany, May 8th, 1832, where also he was educated. His father was a paper maker, who taught his son the trade, and the latter became thoroughly conversant with all the details of the same. In 1850, he emigrated to the United States, and on his arrival in Philadelphia found employment, for a short time, in Irvin Megargee's store. Soon after this he became a hand in the paper mill of William Garrett, in Chester county, and had been in this position but four weeks when he had his left arm caught in the

machinery, by which accident he was disabled a whole year. After filling various engagements in different parts of the country, early in 1866 he became foreman and superintendent of the "Inquirer Paper Mills," at Manayunk, owned by William W. Harding, with whom he remained seven years, when he embarked in his present enterprise.

THE HARRISBURG FIRE BRICK WORKS commenced operations in 1868, and are owned by George Wolf Buehler, Henry McCormic, and William Calder. They are under the management of John B. Keefer, who has an interest in the business. The amount of cash capital originally invested in the business was $30,000, which sum has been since increased to $50,000. The building is located at No. 445 South Second street, Harrisburg, and is L shaped; being 159 by 60 feet, and 140 by 40 feet, thus giving over one-third of an acre in surface. There are about thirty hands constantly employed, much of the labor being performed by machinery. The works have proved a success from their inception; and a ready sale is found for the article manufactured. The present capacity is about two millions of first-class fire bricks per annum; this amount will soon be increased to three millions or upwards; they vary in price from $40 to $50 per thousand. The co-partners are the fortunate owners of 100 acres of land in Clearfield county, Pennsylvania, on which they have struck a vein of clay, similar in appearance to steatite or the soft white soapstone, but differing in grit and plastic qualities. In its natural state, it is hard enough for a whetstone; but pulverized and moistened it becomes like wax; and when subjected to the process of manufacture for brick, produces an article equal to stone, and far surpassing the bricks made from the Jersey clay. The latter was formerly used by the company; but the yield from their Clearfield county land is almost inexhaustible, being from 4 to 7 feet in thickness, and but 5 feet below the surface of the ground. It has been traced for a long distance, and is found to extend under the mountain. The vein or bed is above the coal veins. In some places, near this vein of clay, are also found deposits of a soft plastic clay which is useful for building purposes. The company are now (1874) engaged in building a railroad direct to their clay deposits. At the works in Harrisburg is to be found the most approved machinery, adapted to the crushing and grinding of the clay which is mixed with the Jersey clay, and two large kilns which are alternately used; and they propose to double the capacity of their establishment before the close of 1874. The article as manufactured is of all shapes and sizes, for use in rolling mills, furnaces, and also in private residences, for hearths, gas furnaces, stoves, etc. Tiles of special shapes for floors are also manufactured.

JOHN B. KEEFER, Manager, was born in Harrisburg, Pennsylvania, April 10th, 1832, and is the eldest son of Andrew and Catherine (Bena) Keefer. He was educated in the common and high school of his native city, and when sixteen years old went to Reading, where, in the machine shops of the Philadelphia & Reading Railroad, he served a four years' apprenticeship, remaining there until he attained his majority. He now became engaged in the iron business, and operated a foundry and machine shop in Schuylkill county; while so occupied, he was also superintendent of the Sugar Dale and Homan Oil Companies of Philadelphia, continuing as such for three years, manifesting his capacity and qualifications for other enterprises. In 1868, he became the Manager of the Harrisburg Brick Works, which he still retains.

JOSEPH S. FINCH & CO., Distillers, have their main distillery located in the Thirtieth Ward, south side, of the city of Pittsburgh. In 1863, the senior partner purchased from Thomas Moore, his former employer, the three-storied distillery, 140 by 80 feet, at 189, 191, 193, and 195 First avenue, Pittsburgh, which he operated as sole owner and proprietor until December, 1867, when he associated with him John W. Painter, under the present firm name, and erected the new distillery, which was put into operation in August, 1868. It is 100 by 120 feet, of various heights, to meet the various requirements of its operations, is strongly and securely built in strict conformity with the law of July 20th, 1868, and is fitted up with the most approved labor-saving machinery. It is one of the most complete and admirably arranged establishments of its kind in the country. With its warehouse three stories in height, 60 by 160 feet, capable of storing 20,000 barrels, and various other buildings essential to the successful operation of the works, it occupies about one and a quarter acres of ground. Since the erection of the new distillery the original establishment has been mainly used as a warehouse, although the machinery still remains, to be brought

into use as occasion may require. The original capacity of 600 bushels per day has been increased by the addition of the new works to 1800 bushels or 6000 gallons per day, which can be readily produced by the full operation of both distilleries. The chief products are the "Golden Wedding Rye Whiskey," and the "Family Circle Rye Whiskey," both brands being well and favorably known among merchants and consumers. In addition to barrelmen, trucksters, and general help, the firm employs about forty men. The marked success attendant upon the operations of this enterprising firm is the richly merited result of their promptness and integrity in all their dealings, and the careful supervision of the minutest details of the work in progress.

JOSEPH S. FINCH was born in Westmoreland county, Pennsylvania, December 7th, 1838. He is descended from the well-known Finch family, late of London, England. After enjoying the educational advantages afforded by the common schools of his native county until he attained his twelfth year, he entered the distillery of his father, John Finch, who operated in the southern portion of the county. With him he continued until 1854, when he became manager of the distillery of Thomas Moore, at Guffy's Station, in the same county. His employer, having established the distillery on First avenue, in Pittsburgh, in 1860, sold the same to him in 1863, with the results above noted. Since 1863 he has been a Director of the Youghiogheny Coal Hollow Coal Company, in which he is a heavy stockholder, is also a Director of the Youghiogheny Slack Water Navigation Company, and Trans-Allegheny Canal, and sustains an official relation to many minor enterprises. With a thorough knowledge of his business he combines energy and ability, and has thus won for himself the proud place he occupies. He is ever ready to lend a helping hand to every project affecting the material interests of city, State, or country, and is well known for his public enterprise and liberality.

SHENANGO VALLEY BOILER WORKS, S. Runser & Co., Proprietors. This establishment dates from the year 1868. The firm originally consisted of Sebastian Runser, William McGilvray, Samuel Kimberly, and James Westerman; but since the withdrawal of the last named partner, in September, 1874, the remaining members have continued the business under the style above cited. The works are located on Penn street, Sharon, on the east side of the Shenango river; and from their very commencement have been constantly in operation, and doing a very prosperous business. The manufactures consist of locomotive, flue and portable boilers, oil stills, tanks, salt pans, iron shutters, vault doors, prison work, bridges, and blast furnaces. The trade of late has been chiefly confined to the oil regions, where a large and remunerative business has been done in constructing iron tankage; although of late, owing to the depression in the oil business, they have not been running to their full capacity. They give employment to between twenty-five and fifty hands, according to the demand for their productions. The works are under the management of Sebastian Runser, and are at present in good condition.

SEBASTIAN RUNSER, the principal owner and manager of these works, was born in the Province of Alsace, France, June 18th, 1828, and is one of five children, all of whom are now living, and his mother yet survives at the age of eighty-seven years. His father emigrated to America, in 1832, and located at Massillon, Ohio, where Sebastian was educated. The latter went thence to Mercer county, Pennsylvania, in 1846, where he engaged in the blacksmith business, which he followed for eighteen years. In 1864, he established the extensive planing mill—now owned by J. L. Carver—which he operated until 1868, when he, in conjunction with others, inaugurated the industrial works, which he has most successfully conducted. He is of medium height, heavy frame, with a genial, good-natured countenance, and that pleasing suavity of manner, so characteristic of his countrymen. He is highly esteemed by his townsmen for his sterling honesty and high business qualifications. He was one of the corporators and is at present a Director in the Sharon Savings Bank.

BEAVER FALLS SAW WORKS, Emerson, Ford & Co., Proprietors, were founded by James E. Emerson and Henry P. Ford in 1872, the capital invested at that time being about $50,000. The buildings are very large and now occupy an extent of ground of about five acres. At first employing about ten hands and producing goods to the amount of about $20,000 per annum, the establishment has steadily increased its facilities and trade until it now requires some thirty employés, while the value of its products was over $60,000

during the last year. Much of the success of this enterprise is due to the superior machinery introduced by the senior partner, who has received over thirty different patents for his original inventions. Among others directly connected with the manufacture in which he is now interested is one for perforating saws with apertures. This device lessens the amount of filing, prevents expansion and contraction of the rim by heat and the danger of the saw becoming fractured below the teeth. The original cost of a large saw is nearly or quite expended in three times gumming and straightening; hence the great economic value of this invention. Another, and probably the greatest work of his life, was the perfecting of a circular saw for the cutting of stone of all kinds. In making this great improvement, he saw that the stone-cutter's chisel must be imitated, and that a circular saw must be so constructed that the teeth could be held as if in a vise, and the chisels made so that they could be turned over and over in the saw, on the same principle that the stone-cutter turns his chisel over and over until it is too blunt on the edge for further use. All the difficulties to be met in these matters were vanquished by Mr. Emerson, and his stone saw is a success, as is also a saw the teeth of which are inserted. The same energy, originality and industry which enabled him to perfect these labor-saving machines he now brings to bear upon the details of his business, and the growth of the saw works of Beaver Falls far beyond their present limits is assured under such efficient management.

JAMES E EMERSON was born at Noridgework, Maine, in 1853. He received a common school education and was apprenticed to the trade of a carpenter. After arriving at his majority he followed his trade for several years in Bangor, Maine. In 1850, he removed to Lewistown, where he erected several manufacturing establishments and also produced his first labor-saving invention, a single machine for making spools for cotton. In 1852, he emigrated to California, where he remained, in various employments, for seven years; he then returned to the East and located in Trenton, New Jersey, and engaged in the manufacture of edged tools. Here he became the Superintendent of the American Saw Company, organized to manufacture circular saws of his patent. About this time also he erected the buildings and machinery of the Mercer Coal and Iron Company, of Pennsylvania. In 1872, he, with Henry P. Ford, established the saw manufacturing works in Beaver Falls, Pennsylvania. He is a remarkable man, with wonderful inventive genius and a natural instinct in the powers of mechanics. Over thirty successful labor-saving inventions are the result of his patient, persistent and intelligent labor.

SAMUEL BANCROFT, Manufacturer of Woollen Goods, Delaware county. In 1822, his father, John Bancroft, and family, emigrated from Manchester, England, to the United States, and at first located in the State of Delaware, where, at a mill on the Brandywine, he commenced the manufacture of flannels and stocking yarns, and there continued in that line of business principally until 1827, when he removed to Upper Providence township, Delaware county, Pennsylvania, where he erected a mill for the production of flannels. In 1831, he built another mill, which was situated in Lower Providence township, and continued operating both until 1843, when his son, Samuel Bancroft, the present proprietor, assumed charge of the same, and has been engaged in this business ever since the last-named date. In 1865, the large mill in Lower Providence township was destroyed, and in 1872 another in Upper Providence township met a similar fate. When originally started, they were called a "two sett mill," and from time to time the capacity of each was increased, until eventually thirty-two setts were in use. At present they are each running as a seven sett mill, giving employment to about 130 hands. The works are located on Ridley creek, about midway between Media and Chester. There are three buildings altogether, one mill being 86 by 46 feet; a second measures 60 by 40 feet; and the third is 40 feet square, all three being each three stories high. The goods at present manufactured are exclusively high grade flannels and beaver cloths. The reputation of these mills has been established for many years, and at the annual fairs of the Franklin Institute have carried off the highest award for excellence of fabric, texture and finish. The amount annually produced exceeds $300,000 in value, and the goods find a ready market in both Philadelphia and New York city. The machinery in use is the best that can be procured, and the proprietor attributes his success to his constant application to business, the employment of the most superior materials, the care exercised in the manufacture and the production of only a standard, first-class article.

SAMUEL BANCROFT was born in Manchester, England, July 25th, 1804, and is a son of

John and Elizabeth (Ward) Bancroft, formerly of that city. His maternal grandfather, John Ward, was one of the first cotton factors in Great Britain. He came to the United States, with his parents, in 1822, and was always connected with his father in the business, eventually succeeding him, as above stated.

STEWART & MATTSON, Manufacturers of Hardware, Philadelphia, occupy the range of buildings extending from No. 447 North Broad street to the corner of Buttonwood, having 60 feet frontage on the former avenue and a depth of 30 feet. The business was first established in 1867, by Gregory Stewart & Co., who were subsequently succeeded by the present firm. Various articles of hardware are here made, but locks and door knobs have become a specialty; of the latter an immense number is produced, two orders having within a short time been received from Chicago, which called for 10,000 dozen. The competition in these, however, is so great as to render this branch very unprofitable. The capacity of the works has latterly been largely increased, enabling the proprietors to manufacture 300 dozen door knobs complete in a day. The machinery in use is of a very superior character, and it has been greatly improved by the ingenuity of the senior partner. The rapidity with which the square pieces of iron are converted into the finished knob is surprising. The iron is first marked by a heavy pressure, and thence passed to the drilling machine, of which there are several, each attended by one person. When this object is accomplished, it is conveyed to the machine where the "worm" is made, and after manipulation here is polished and ready for use. Two tons of lead are used monthly to "set" the iron in the knobs, which, of itself, is quite an item. Large numbers of store knobs are likewise produced at this establishment, and many varieties of locks are also manufactured; the latter differ in price from $2 to $60 per dozen. The locks for the cabins of the American Line of steamships were made here, and are of a very superior character. There are about forty hands constantly employed by the firm in the factory, and a steam engine of fifteen horse power drives the machinery. The annual business is about $80,000, which, with the present facilities and improvements, can be doubled. The trade is principally with the West and Northwest, a large proportion of which, as already mentioned, comes from Chicago. The competition alluded to above seems to have been stimulated by the large and unusual demand from the "Garden City;" but a house which has been so ably conducted as the one now under consideration, by the experienced and enterprising gentlemen who compose the firm, can have no difficulty in overcoming this unhealthy condition of the market.

IVINS & BROTHER, Furniture and Upholstery Manufacturers and Dealers, Philadelphia. The partners in this firm are S. Woolston and William H. Ivins, who, in February, 1870, purchased an establishment then located at No. 337 North Second street, paying the sum of $5500 cash therefor. The business was both wholesale and retail, and there were six hands employed in the factory, beside the partners, who also gave their individual attention to the establishment. The product and sales during the first year amounted to about $25,000, and showed from month to month a sound basis and continuous increase. As the premises in occupation did not admit of extension, the firm were compelled to remove to the four-storied building No. 66 North Second street, which, together with the second, third and fourth floors of the two adjoining and communicating tenements, Nos. 64 and 68, gave them eleven large rooms in which to carry on their prosperous enterprise; in addition to these, they also occupy the basements of all three edifices. They removed to this location March 1st, 1873, and during the year, notwithstanding the financial depression of the times, their business exhibited a marked increase over corresponding periods of previous years. Their products during 1873 increased 400 per cent. over the first year, while their sales were more than doubled; and during the first quarter of 1874 there was a marked and healthy increase of the business as compared with the corresponding period of 1873. The firm now employ fourteen hands, including one female operator on the sewing machine, and during busy seasons they frequently double their force of operatives. Many articles which they formerly purchased they now manufacture themselves. In extending their business more capital was demanded, which they themselves furnished as required, until the amount invested has more than doubled since the enterprise originated. They ascribe their success principally to their individual supervision of their factory and their determination to succeed, combined with a rigid economy. Their first location (owing to the class of goods previously sold) was altogether unsuited

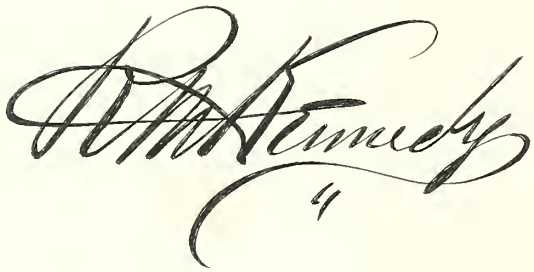
to their wants, a young firm requiring every encouragement from the public, without any slurring remarks as to the antecedents of their location. They determined to live down the odium by producing a good article, selling it at a fair price, and permitting no false representations, believing that fair dealing with customers will prove of benefit in the end, by causing their patrons to visit them again and make more extended purchases.

S. WOOLSTON IVINS was born at Penn's Manor, Bucks county, Pennsylvania, in 1836. He is of German extraction on his father's side, and his mother was of English descent, her ancestors having been followers of William Penn. He was educated in the public schools of Philadelphia, and afterwards returned home and labored on a farm. In a few years he married and purchased a portion of Penn's original manor, where he remained until 1868, when he disposed of his farm and shortly after removed to Philadelphia.

WILLIAM H. IVINS was born at Penn's Manor, March 11th, 1840. He was educated partly in Philadelphia; graduated first at the Central High School, and afterwards studied at Amherst College, Massachusetts, and Union College, Schenectady, New York. In 1859, he left the latter institution, and, returning to Philadelphia, became a teacher of languages in the Friends' High School, where he was so engaged for three years. He then became book-keeper in a large clothing manufactory on Third street. In the spring of 1863, he received an appointment in the War Department at Washington, where he remained nearly a year, and then, receiving a more lucrative offer from a firm which had dealings with the Government, he became connected with the latter; but deeming this only a temporary occupation, after a year's engagement he entered a jobbing house on Market street, where he remained until the close of 1869. In the spring of 1870, he associated with his brother, as above mentioned, in their present business.

ROBERT MONROE KENNEDY, of Pittsburgh, sole Proprietor and Manufacturer of Dr. Radcliffe's great remedy, "Seven Seals, or Golden Wonder," was born at Warranstown, county Down, Ireland, May 24th, 1843. His parents having emigrated to the United States in 1845, settled in Pittsburgh, and here he passed his childhood and boyhood, receiving such education as the common schools of the period afforded. When but fifteen years old he engaged in the jewelry business on his own account, and so continued until 1867, when he disposed of his interests to other parties. It was in 1869 that he founded the present enterprise under the firm name of Kennedy & Co., which is still retained. With one assistant he commenced operations in a small room on the fourth floor of a building at Fifth avenue and Wood street; his total capital being but forty-two dollars. He had previously procured from his relative Dr. Radcliffe, a celebrated physician of Bath, England, a copy of his famous recipe, from which he compounded the medicine at present so widely known and so extensively used. At the commencement of the enterprise he was able to produce about ten gross per week, gradually increasing the amount for about four years, when, the demand constantly augmenting, it was deemed advisable to seek a more extended space wherein to manufacture the article. In 1871, he removed his establishment to its present location, at the corner of First avenue and Wood street, where he occupies a handsome three-storied building 20 by 100 feet, fitted up with the most approved appliances, and every convenience that can contribute to the successful operations of the business. The basement is used chiefly for storage of material from which the medicine is compounded; the first floor is occupied by offices, packing rooms, mailing department, and for the receiving of finished goods; the second floor is devoted to the preparation of medicines; while on the upper or third story is an extensive laboratory, where the "Remedy" is carefully compounded under the immediate supervision of the proprietor, whose able direction is observable in the admirable system which prevails throughout the establishment. In 1872, it was found necessary to accommodate the increasing trade, and a branch house was opened on Isabella street, Allegheny City, in a two-storied building 20 by 40 feet. In these two localities some forty-two hands are constantly employed; many of these being clerks in the mailing department. The cost of printing circulars is $20,000 annually, while half a million stamps have been received from the department upon a single order. Recently a purchase of no less than $5000 worth of postage stamps was made at the Pittsburgh office at one time, and the next week $1000 worth more were required. It is said he does more business with the Post-Office Department than any other establishment outside of New York city. The produce of the works average 540 gross each week, being nearly five million packages per annum. It is used all through

Galaxy Pub Co. Philadelphia.



the States, Territories, the Dominion of Canada, and South America, while it is rapidly obtaining a foothold in foreign countries. It is a purely vegetable remedy, and is wonderful in its effects in allaying pain occasioned by acute diseases; not only affording temporary relief, but effecting a permanent cure in chronic cases, where other remedies have failed. The success of the proprietor has been almost without precedent, and is not the result of mere chance, but that which follows a well-directed energy and a judicious and liberal application of the proper means to promote his business interests. Apart from his own peculiar calling, he is largely interested in various measures pertaining to the development of the city, and is a considerable shareholder in the Homestead Bank, Smithfield Savings Bank, and the Duquesne Savings Bank, of which latter he is also a Director. He is also a Director of the Iron City Insurance Company of Pittsburgh; President of the Merchants' and Manufacturers' Building and Loan Association of Allegheny; and President of the First National Building and Loan Association of the same place. The latter has a capital of $500,000. He is also interested in other corporate institutions. His record is a fitting comment upon, and a noble incentive to, the exercise of that great energy which surmounts all obstacles, and wins for itself fortune, fame and honor.

MONUMENTAL GRANITE AND MARBLE WORKS, Pittsburgh. This business was formerly carried on at Xenia, Ohio, by Dodds & Caskey. A growing demand for their work in western Pennsylvania induced them to locate in Pittsburgh in 1872. Business prospered with them. About two years afterward the firm was dissolved, and Alexander Caskey assumed the control of the business. The office and workshops are located at the corner of Penn avenue and Thirty-second street. Mr. Caskey makes a specialty of the importation and dressing of Scotch granites, although the American article, together with marble work, also enters largely into his business. He is probably the largest dealer in his special line in the State west of the Alleghenies, and the demand for his work is yearly increasing. In monumental and cemetery work generally the use of the finer qualities of granite is fast superseding marble. It is more durable, and is less liable to become unsightly through the ravages of time. Mr. Caskey owes his success to keeping these facts before the public and to the use of the best foreign and native granites to be obtained. The first year after the location in Pittsburgh, their business amounted to $45,000, two-thirds being importations. From ten to twelve hands are employed steadily. The proprietor is a Scotchman by birth, and was born in 1841. He came to this country in boyhood, and attained to his present prosperity by hard work and methodical business habits.

JOHN GRAVENSTINE'S MANUFACTORY OF REFRIGERATORS, Philadelphia. This establishment is still quite in its infancy; but, judging from the rapid growth which has hitherto characterized it, great things may be predicted for the future. Dr. Gravenstine, who was in the medical profession, was often struck with what seemed to him a want of some wholesome mode of refrigeration; so was led to make several experiments on an entirely new plan; and the improvement seemed so great and important that, in July, 1871, he was induced to take out a patent and start a manufactory on a small scale in a building on Barclay street, above Broad. Here he continued one year, during which he made and sold 300 refrigerators. Thus encouraged, he removed to premises on Broad street, below Vine, comprising a four story building, with a frontage of 20 and a depth of 60 feet. During the second year the produce was 500 refrigerators; and in September, 1874, he purchased and removed to the large building in Melon street, which he now occupies, and which was in fact a place of worship, known quite lately as the Heidelberg Church. This building, which has a frontage of 60 and a depth of 84 feet, and is lofty in proportion, is very suitable for its present use, being well lighted and spacious, and affording great room for storage; and, when it has received some contemplated improvements, will be well adapted to meet the rapidly growing trade. One thousand annually is the average number of refrigerators now produced; yet, notwithstanding this, the trade is still only retail, the demand being so much in excess of the supply; but with the facilities soon to be possessed, a large wholesale trade will speedily be organized. The proprietor of this establishment attributes his success to the great advantages possessed by the article he has patented, the arrangements of which are such that there is a constant automatic circulation of pure, cold dry air; and the vapor rising from the various articles placed in the refrigerator is at once carried off and condensed. No metal lining is used; consequently there is no

oxidation, and poisonous gases are not generated. This is the only refrigerator for which a silver medal was awarded at the Franklin Institute Exhibition of 1874.

JOHN GRAVENSTINE, M. D., was born November 11th, 1821, and is a native of Philadelphia, in which city he was educated, and in which he studied medicine and practised as a doctor till commencing the manufacture in which he is now engaged. He married in 1842, and has three children.

FORT PITT IRON AND STEEL WORKS, Pittsburgh, Jacob Reese, Matthew Graff, Thomas Graff and William Woods, Proprietors, stand in the first rank among the greatest enterprises of both the New World and the Old, and in their particular department are in many respects entirely unrivalled. The business was founded in 1862, by David Reese and William Graff, for the manufacture of iron, and was supplied with ten furnaces. In 1868, Andrew I. Wull was admitted to partnership, and the firm name was changed to Reese, Graff & Wull, operations being inaugurated with a capital of $100,000. In 1869, the last admitted associate withdrew from the establishment, and the name of the firm was again changed to that of D. Reese, Graff & Co., Thomas I. Graff purchasing the interest of the withdrawing partner. The manufacture of German steel was commenced in 1866, and in 1867, that of cast steel was introduced. Tools and workmen were then imported from Sheffield, England, and the establishment succeeded finally in turning out a very superior quality of steel; the business meanwhile greatly prospering and increasing in extent. In 1872, William Woods, formerly a partner in the house of Anderson & Woods, was admitted into partnership, and was intrusted with the practical charge of the works, which were immediately enlarged by the addition of two Siemen gas furnaces and two steam rammers, one three cut and one 35 cut. The style of the firm was then changed to Reese, Graff & Woods, while the capital was increased to $600,000. In the meantime the iron department had increased to a capacity of 12,000 tons per annum of finished iron—from fifteen to twenty tons per diem. The premises occupied by this extensive firm are situated on Thirty-second street and Allegheny river, Pittsburgh, and its annual business is more than $1,500,000. In the various departments between 625 and 650 men and boys are employed, while the sum paid out to those employés affords direct sustenance to at least 2500 persons. The special manufactory for horse-shoes, constructed upon the model of a new design invented by Jacob Reese, and patented from 1857 to 1865, is 60 by 68 feet, and solidly built. The iron and steel of the Fort Pitt Works is widely renowned for its valuable qualities, and no article is permitted to leave the establishment until it has passed through a careful examination, and the rigid application of severe and searching tests. In 1873, that establishment made the steel for the new Safe Deposit Bank in Philadelphia, which, after a thorough course of testing, was admitted to be entirely drill-proof. In 1874, to it was awarded the contracts for making homogeneous plates for the new water-works' boilers for the city of Pittsburgh, an undertaking of considerable importance and responsibility.

JACOB REESE was born in Wales, Great Britain, in 1825, and came to this country in 1832; his father built the works for the Valentines at Bellefonte, Centre county, Pennsylvania, and also introduced there the puddling process; in 1835, he moved to Pittsburgh and connected himself with the Birmingham Iron Works, being the first also to introduce puddling in that city. There Jacob learned the business of puddling, hammering and rolling, and in 1839–'40, was employed at the Wilkesbarre Iron Works, Luzerne county, Pennsylvania. In 1841, he returned to Pittsburgh, and was connected with Spang & Co.'s iron works until 1848, during which time he designed the plans and aided in constructing the Sharon Iron Works, in Mercer county, Pennsylvania, owned by Bennett, Marshall & Co. In March, 1854, he was employed by the Cambria Iron Company. Suspending operations in 1856, Wood, Morrell & Co. took charge of their works, and he lost his position as superintendent. He then occupied himself in manufacturing rolling-mill supplies, and was the first to introduce into this country the Lake Superior iron ore for furnace linings; at that period he was engaged also in mining Lake Champlain and Canada ores. Upon the discovery of petroleum, in 1860, he associated himself with Melliser Graff in the business of refining, and prosecuted that enterprise with great success until 1864. Owing to the difficulty of securing sufficient hoop iron for their barrels, they started the Fort Pitt Works to make their own iron, and from that beginning has arisen the present vast enterprise. He is possessed of a sound practical education, and is a member of the Institute of American Mining Engineers.

MATTHEW GRAFF was born in Blairsville, in

PITTSBURG FOUNDRY

J. J. Garrison & Co. Chilled Roll Works, Pittsburg, Pa.

1836, and since his eighteenth year has been constantly and actively engaged in the iron business; evincing in his business career great enterprise and ability. Prior to his identification with the Fort Pitt Iron Works, he was connected with the house of Emerson, Crescent & Co.

WILLIAM WOODS was born in Westmoreland county, Pennsylvania, in 1824. After leaving school, he was employed in the edge tool and shovel manufactory of his father until he had attained his majority, and, in 1845, entered the house of Jones & Twiggs, then engaged in the manufacture of steel springs and axles. In 1862, he left the rolling department, and, taking charge of the works as manager, occupied that position for three years. Subsequently, he went into the coal and coke business, but later, in 1865, with J. W. Cook, Anderson, and Robert Woods, he purchased the steel business of Jones, Boyd & Co., and remained in this connection until 1873, when, selling his interest in the establishment, he identified himself with Reese, Graff & Co., and the firm became known under its present style. He was married, July 4th, 1844, to Mary B., daughter of David and Sarah Clark, old settlers of Pittsburgh.

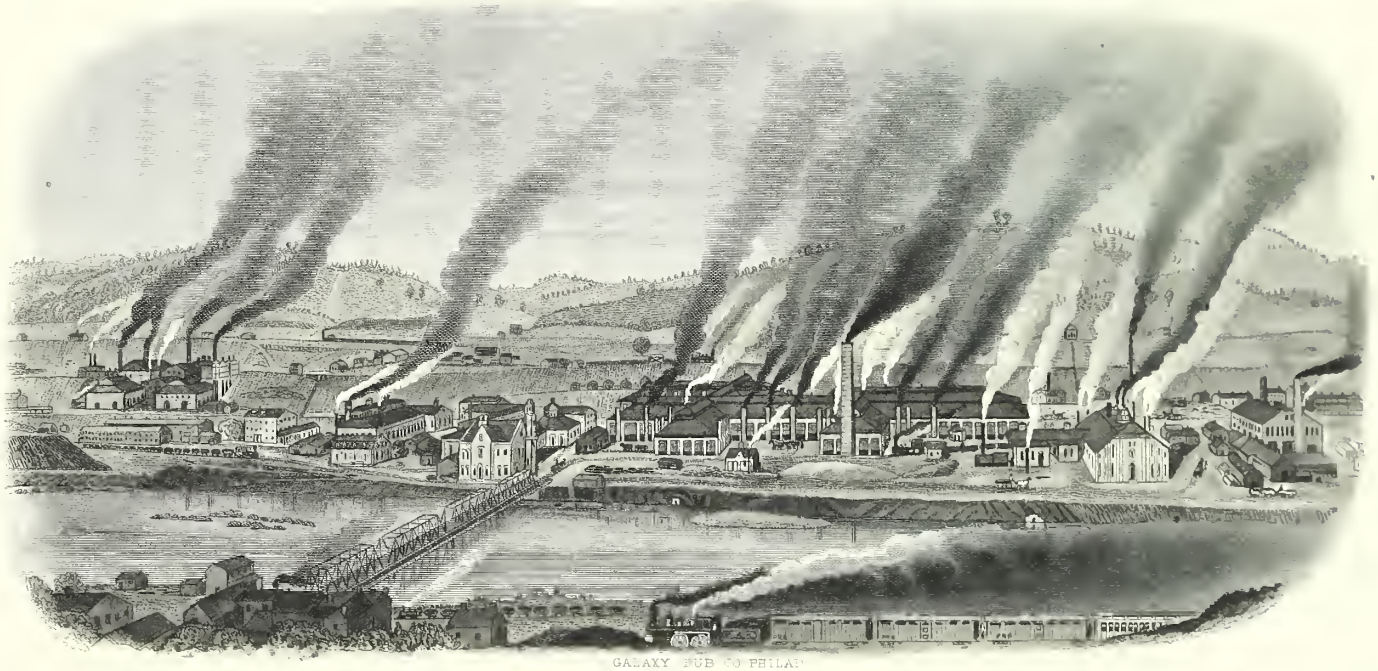
PITTSBURGH IRON FOUNDRY, Pittsburgh, was established in 1803, by Joseph McClurg, Joseph Smith, and John Gormley, on the ground now occupied by the Custom House, corner of Fifth avenue and Smithfield street, and was probably the first foundry originated west of the Alleghenies. Smith and Gormley subsequently disposed of their interests to Joseph McClurg, who, with his son, Alexander McClurg, conducted the business successfully until 1814. In 1811, or 1812, they made the first contract with the United States Government for the manufacture of cannon balls for French guns, which, upon the declaration of war with Great Britain, in 1812, were sent to New Orleans, where they were efficiently used by General Jackson, on the 8th of January, 1815. They contracted with the Government also for the manufacture of cannons, cannonades, howitzers, shells, and balls, during the progress of that conflict. Frequently, at this period, ten or twelve wagons were observed at one time standing in front of the old foundry, waiting until the projectiles became sufficiently cool to load for conveyance to Commodore Perry at Erie. From 1814 to 1822 the foundry was conducted by McClurg & McKnight, and subsequently by Alexander McClurg & Co., until 1830 or 1831, when the establishment was purchased by Kingsland & Lightner. The first contract of water-pipe for the city of Pittsburgh was made in 1826, by Alexander McClurg & Co., of the Pittsburgh Foundry, and Kingsland, Lightner & Co., then proprietors of the Jackson and Eagle Foundries. The first pipe was cast in January, 1827, and tested at the pond between Smithfield street and the Cathedral. The first chill rolls made west of the mountains were cast by the latter firm, in 1825, under the superintendence of Lawrence Kingsland, the senior partner. From 1831 to 1836, the establishment was conducted under the style of Kingsland, Lightner & Cuddy, when the senior member of the present firm (A. Garrison & Co.) obtained an interest in its management. Subsequently, H. L. Bollman and A. Garrison purchased the interests of the other partners, and associating with them H. F. Bollman, the firm became known as Bollman & Garrison, remaining thus until 1851, when H. F. Bollman withdrew from the partnership. The present firm consists of A. Garrison, J. H. Ricketson, and William Holmes. In the spring of 1852, the foundry was removed from its original site to its present location, the corner of Ninth and Bingham streets. For fifty years the manufacture of chill rolls has been a specialty of this firm, these rolls varying in size from 4 inches to 31 inches in diameter, from 6 inches to 9 feet in length, and from 100 pounds to 15 tons in weight. The best iron, especially sheet and plate iron, and homogeneous steel, is rolled under chill rolls, which are also indispensable in rolling lead, brass, copper, zinc, silver, gold, paper, India rubber, and straw boards; the rolls are made of the best cold blast charcoal iron, and the foundry building where they are manufactured is 170 by 86 feet. In the foundry are two large reverberatory furnaces, and one cupola, capable of melting from forty to fifty tons of metal per diem; also one steam crane and five others for lifting heavy castings; also crane ladles holding from one to ten tons of melted metal. The machine shop, occupying the ground floor of a three-storied brick building, is 34 by 180 feet, and is furnished with lathes, by means of which the rolls are made ready for use; it contains eleven large lathes, one of which swings seven feet between the shears. There are also large planers, two large drill presses, an upright and a horizontal coring lathe, and a coring mill; the lathes will turn rolls varying from 4 to 36 inches in diameter, and from 6 inches to 10 feet in length. An additional machine shop, 60 by 40 feet, for fitting up heavy rolling mill trains, is also furnished with a

steam crane for handling heavy castings. The dimensions of the blacksmith shop are 42 by 25 feet. The pattern shop is in the second story over the machine shop, whose third story is used for storing light patterns. A separate two-storied building is filled with patterns of every description, placed there in order to protect them from fire. The rolls of this firm are in use throughout the United States, also in England, Belgium, Russia, and France.

ABRAHAM GARRISON, the senior partner in the firm of Garrison & Co., was born in Orange county, near West Point, on the banks of the Hudson river, New York, in 1804. For many years his father has been engaged in navigating boats on the above-mentioned river, and is widely known and respected as an honorable and able citizen. He was educated in the common schools of his native county, and was subsequently associated with his father in the Hudson boat navigation enterprise, until he had attained his majority. In 1826, he moved to Pittsburgh, Pennsylvania, and occupied himself in learning the foundry business with his uncle, Lawrence Kingsland. At the expiration of two years he returned to his former employment on the Hudson river, and continued in that occupation for about five years. Returning to Pittsburgh in 1833, he was employed as manager by Kingsland, Lightner & Co., with whom, in 1836, he was associated in partnership. This association dissolving in 1839, its business was continued by him and H. L. Bollman, and, in 1864, he became the owner, by purchase, of its entire interest. He is President of the Diamond Savings Bank, and of the Pittsburgh & Monongahela Bridge Company, and has also occupied many other positions of trust and honor.

GARDNER BROTHERS, Pittsburgh and Lockport, Manufacturers of Fire Brick, Fire Clay, Gas Retorts, etc., etc. The works of this firm are situated at Lockport, on the Pennsylvania Railroad; their business office is at No. 95½ Fourth avenue, Pittsburgh. The business was commenced in 1865, the firm at that time being Willson & Gardner. Their capital then was $10,000, and the trade of the first year amounted to just about the sum invested, the works giving employment to thirty hands. Under the original firm appellation the productiveness of the works was greatly increased, and their manufactured articles widely introduced to consumers, the advancement in prosperity being noted by a double amount of sales each succeeding year. In January, 1873, Mr. Willson retired from the firm, and business has since been carried on by William Gardner of Pittsburgh, and James Gardner of Lockport, under the co-partnership title of Gardner Brothers. Fortune has smiled upon the industrious efforts of the new administration. $75,000 of capital and sixty-five employés are now required to meet the demand for the productions of their manufactory, the aggregate amount of cash received therefrom being over $100,000 per annum. This enlargement of the operations of the firm presents the best commentary upon the manner in which, from the first, the trade has been conducted. The specialties to which particular attention is given are, the material for gas works, gas retorts, and tile for the lining of blast furnaces; and the excellence of the productions in this line, added to judicious management, industry, skill, and commercial integrity, is the secret of their present prosperous condition and an assurance of their continued success in the future.

PITTSBURGH COPPER AND BRASS WORKS, C. G. Hussey & Co., Proprietors, are located at Soho, a suburb of Pittsburgh, on the banks of the Monongahela river. As the only establishment in the State, and the first one in the country, devoted exclusively to the reduction of American ore, its history is worthy of special attention. In 1843, Dr. Hussey became interested in the copper territory of the upper peninsula of Michigan, and, at first, acquiring his title by lease, and locating his claims, he purchased the property which he had "located," as soon as the Government placed it in the market. In 1845, with certain Eastern capitalists, whose interests were identical, he formed a joint stock company, entitled the "Pittsburgh and Boston Mining Company," of which he subsequently became President. The same year they opened the "Cliff Mine," on Eagle river, which established the value of the mining district of that section, and produced about eight million dollars worth of copper before exhaustion. Rendering this ore into metal was at first a slow operation. There were but four smelting mills in the country at this date, and none were able to meet the necessities of reducing the ponderous blocks of almost pure copper produced in the Superior region. Dr. Hussey conceived and perfected an idea, whereby these heavy blocks, sometimes weigh-



GALAXY PUB CO PHILA

Cambria Iron & Steel Works, Johnstown, Pa

ing four or five tons, were deposited in the oven of the reverberatory furnace by means of a movable top, and this he proceeded to practically test by erecting the Pittsburgh furnace, in 1850. The success was so complete that the improvement was adopted by every furnace in the country using the Lake Superior ore. The mines from which the raw material was obtained have of late been exhausted, and but little is now done at the furnaces except melting the "scrap." The metal at present worked is obtained from smelting works on the Lakes, and is received in flat blocks weighing about 100 pounds each; these after being heated and reduced to the thickness desired, by passing through rolls, have the oxide, which forms upon the surface from contact with the air, removed by a process peculiar to these works. This process, though simple, requires great experience and skill in its proper manipulation. From seventy to one hundred employés are constantly here engaged; they are mostly Welsh, from the Swansea district. The value of the annual product of these works amounts to from seven to eight hundred thousand dollars. The brass foundry contains ten furnaces. The copper and zinc are placed together in crucibles, in such proportions as will produce the best quality of brass, and, when melted, the metal is moulded in flat cakes which, after being annealed in an oven, are rolled into whatever thickness of sheet is desired, the oxide being removed and the product left pure and ready for the market. The original and present members of the firm controlling this important industry are C. G. Hussey and Thomas M. Howe.

CAMBRIA IRON WORKS, at Johnstown, originated early in 1853, through the efforts of Dr. Shoenberger and George S. King, who organized a company with the view of erecting a very extensive rolling mill for the manufacture of railroad iron. A large portion of the stock was taken by Philadelphians, and the projectors proceeded to lease several of the approximate blast furnaces, together with the adjacent mineral lands, and a large tract of bottom land lying immediately below the town. The latter was laid out into building lots and grounds for rolling mill, blast furnaces, etc., and work was commenced. Before the company had completed this gigantic undertaking it failed. It was, however, encouraged to make an effort to retrieve its credit by the addition of fresh capital. This effort was made, and the late Matthew Newkirk was induced to invest largely in the stock of the company, and to become its President. But the second effort to make the works a paying investment failed utterly, and, in 1855, the company again suspended. Some of the original stockholders, however, had faith in the enterprise, and believed it might, under proper management, yet become successful. Accordingly, in the same year, Charles S. Wood, Richard D. Wood, Daniel J. Morrell, Edward Y. Townsend, George Trotter, Matthew Newkirk, and others, organized the firm of Wood, Morrell & Co., to whom was leased the Cambria Iron Works for a period of five years. The firm at once took charge of the property, and Mr. Morrell removed to Johnstown, becoming its resident representative and the active manager of its affairs. In 1860, the lease of the works was extended for two years, and, in 1862, the Cambria Iron Company was reorganized, with Charles S. Wood as President, Edward Y. Townsend as Vice-President, and Daniel J. Morrell as Superintendent of the works. Since that date the new company has had control of the works, absorbing the firm of Wood, Morrell & Co. Since 1855, notwithstanding many untoward events, the works have been kept in constant operation, and, through successive enlargements, they have become the most extensive of their kind in the country, and among the first in the world. In 1872, they turned out over 80,000 tons of railroad bars—about one-tenth the product of the whole United States. The company is now the owner of extensive tracts of iron and coal lands, aggregating over 50,000 acres. The coal is semi-bituminous and makes splendid coke, which is invaluable for its numerous blast furnaces. 1400 tons of coal are mined every day, as also 500 tons of iron ore. All the coal, excepting that disposed of to the employés, is used by the company in its mills and furnaces. It is also an extensive purchaser of Lake Superior and other high-classed iron ores. The enormous consumption of the raw material may be imagined when, to produce one ton of pig iron, there are required six tons of iron ore, coal and limestone; and the company manufactures every day about 300 tons of pig iron. This is, however, only in the blast furnaces. There are the Bessemer Steel Works, the blooming and rolling mills, and all the various shops and forges to be supplied with coal; and these blooming and rolling mills turn out 300 tons of iron and steel rails per diem; in a year about 70,000 tons of iron rails, and 35,000 tons of steel rails. The area of ground covered by these enormous works is over sixty acres, the rolling mill alone occupying seven acres. This great mill, with all its costly machinery, was nearly destroyed by fire on October 12th,

1872. In ten days thereafter, owing to the indefatigable exertions of the Superintendent, a temporary roof was up, new machinery erected, and the mill itself in operation. In the rolling mill there are no less than seven trains of rolls, each train having five pair of rolls. To keep these rolls supplied with heated metal requires twenty-eight heating furnaces, while forty-two double puddling furnaces furnish the heaters with the puddled bars. The great success which has of late years attended the company is to be attributed to the fact, that from the first its members have been governed by a firm and conscientious resolution to produce the very best rails, either iron or steel, which can be made by the most skilful labor from the very best material.

HON. DANIEL J. MORRELL, Superintendent, was born in the township of Berwick, York county, Maine, August 8th, 1821, and is the seventh child of Thaddeus and Susan (Ayres) Morrell, who are yet living on the farm, both now upwards of ninety years of age. . When old enough, he was taught to assist in the labors of the farm, and during the winter months he was a regular attendant at the common country school ; and this meagre education was only supplemented at a later day, and after his entrance upon business life, by the information gained at a commercial college. In his sixteenth year he left home and went to Philadelphia, to which city he had been preceded by his elder brother David, who was then a member of the firm of Trotter, Morrell & Co., in the wholesale dry goods trade. With this firm he was employed as a clerk for five years, and, in 1842, when it dissolved, his brother and he continued the business. In 1843, they established branches at Cincinnati and St. Louis, the junior member having charge of these establishments. In 1844, these branches were abandoned, and the Philadelphia house having been removed to New York, he proceeded thither. The following year this business was disposed of, when Daniel returned to Philadelphia, and became associated with Oliver Martin, dealer in fancy dry goods, first as clerk, then as partner ; the firm being Martin, Morrell & Co. In 1854, Mr. Martin died, and Mr. Morrell became executor of the estate ; but the business continued until the following year, when it terminated. During his residence in Philadelphia, and in his leisure hours, he was a great reader, and through his intimacy with the attachés of Grigg & Elliott, the eminent book publishers, enjoyed excellent advantages for procuring the newest and best books. He also shared the rich treasures of the Apprentices' Library and the library of the Franklin Institute. He also became connected with literary and debating societies, and was likewise a regular attendant upon the lectures of the Franklin Institute. After his connection with the Cambria Iron Company commenced, he took a great interest in the growth and prosperity of Johnstown. Mainly through his influence, and that of his business associates, gas and water-works have been established, streets paved, markets improved, and a new life infused into the wretched agriculture of the neighborhood. The thousands of employés at the works have been encouraged to invest their surplus earnings in homes and in savings banks. He has served as a member of the borough council for sixteen years, giving careful attention to all the details of its government. During the rebellion he greatly aided the Union cause by encouraging the enlistment of volunteers. When the war closed, his great ability, patriotism, and his intelligent and influential advocacy of the protective policy, were recognized by the people, and he was twice chosen as their Representative in Congress, serving from 1867 to 1871. In the Fortieth Congress, to which he was at first elected, he was made Chairman of the Standing Committee on Manufactures, which he retained during the Forty-first Congress. He was also a member of other important committees during his four years' service in that body, including that on the Pacific Railroad. His speeches and reports on questions of national importance evinced a breadth of view and depth of research far beyond the range of the mere politician and timeserver. A prominent feature in his Congressional career was his introduction in the House, March 9th, 1870, of a bill to provide for the celebration of the centennial anniversary of American independence, which became a law mainly through his persistent advocacy, and through his great speech, delivered December 14th, 1870. Upon the organization of the Centennial Commission he was selected as Chairman of the Executive Committee, and as such he has given his time and attention to further its interests and the interests of the International Exposition.

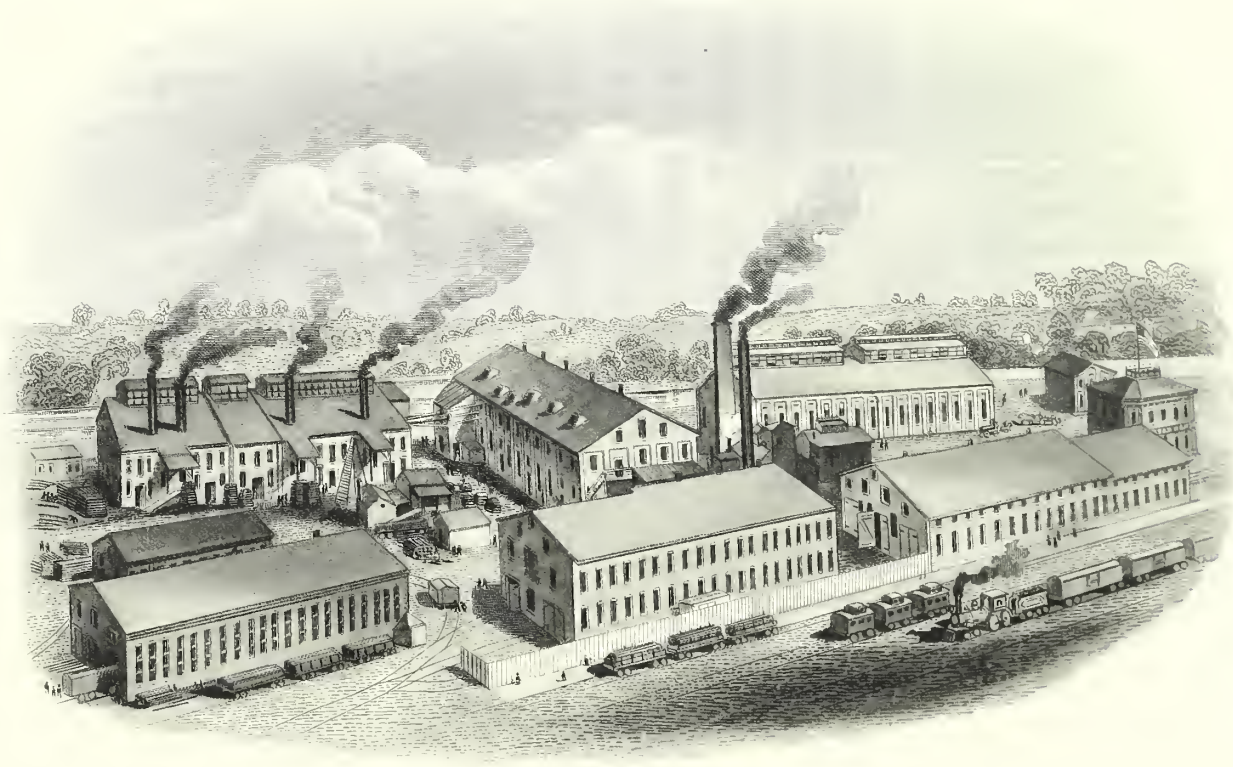
S. WHITE'S DENTAL MANUFACTORY AND DEPOT, at the southeast corner of Chestnut and Twelfth streets, Philadelphia, is without doubt the largest establishment of its kind in the world, and it is as celebrated in the variety and quality of its productions as for the vast quantity of articles fabricated. Away back in 1844, the pro-

prietor inaugurated his business as a manufacturer in a workshop on Race street above Eighth, where he commenced the manufacture of artificial teeth. As time progressed, and his success was assured, he associated with him two partners, Asahel Jones and J. R. McCurdy, and finding his original stand too circumscribed to accommodate the business, the firm removed, in 1848, to a larger building on Arch street, east of Sixth. Two years later it was necessary to erect a much larger building two doors lower down. In 1846, a branch house was opened in New York city for the sale of their productions, and five years later a similar branch was established in Boston; and as there was a large field in the Western States for operation, a third branch was located in the city of Chicago in 1858. In 1859, J. R. McCurdy withdrew from the firm, and two years later the co-partnership was again dissolved by the retirement of Mr. Jones, leaving the original proprietor the sole owner of the business, which it is needless to say continued augmenting with each returning year; and so many and varied were the articles now manufactured as to demand a larger edifice to accommodate the growing trade. The building to which Dr. White removed, and which he erected in 1868, has a front on Chestnut street of 44 feet of pure white marble, a depth of 235 feet on Twelfth street, the rear fronting on Sansom street, and a height of 90 feet to the cornice. It is of five stories besides the basement, which latter is vaulted out beneath the pavement on the front, side, and rear, and contains the boilers, engine, furnaces, mills, forges, and a series of immense bins for storing materials, crude and prepared, and work-rooms for certain classes of work. The first floor has been leased for a term of years to Bailey & Co., jewellers. The second floor is the dental salesroom, and contains the counting-room, private offices, and the publication office of the *Dental Cosmos*. It is elegantly fitted up, and provided with every convenience for the display of an immense stock of dental materials and the despatch of business. The salesroom is approached from the Chestnut street front by a beautiful flight of white marble stairs. The entrance of the third, fourth, and fifth stories is by two stairways on Sansom street—one for the male, and the other for the female operatives. The third floor is divided into four rooms, and is devoted to the various processes of making artificial teeth. The fourth floor is used exclusively for the manufacture of dental instruments and appliances; while the fifth floor is appropriated to the preparing and putting up of the various articles for office and laboratory use, and for packing and storing. All the apartments throughout are admirably lighted and ventilated, and warmed by steam. Various mechanical contrivances exist to facilitate the transactions, including a steam elevator extending from the basement to the fifth story, three dumb waiters for the conveyance of light packages from the manufacturing departments to the salesroom, while a formidable array of speaking tubes traverse the entire edifice. The whole building is fire-proof; the walls are of immense thickness, and each floor is supported by compound wrought-iron beams that cross the entire width, spanned by brick arches, with no columns to interrupt the view. The cornice is of galvanized iron, with iron supports, and the roof is of iron frame-work covered with tin. The cost of the building was about $460,000. Nearly 300 persons find steady employment in the establishment, and the pay-roll weekly averages $3000. A half million of teeth are turned out every month, which are shipped to every State in the Union, and very large quantities are annually exported to every civilized country on the face of the earth. Not only these, but dental instruments of every pattern, are produced in endless variety—dental chairs for office use, gold foils, corundum wheels—and these are disposed of in large quantities. As an indication of the very superior workmanship which characterize the artificial teeth made in this establishment, as well as the dental materials, it is only necessary to state that to the close of the year 1874, Dr. White has been the recipient of fifty-six first-class premiums, gold and silver medals, and honorary diplomas from various exhibitions, fairs and expositions, including those of London, New York, Paris and Vienna—the diploma of honor at the latter exposition in 1873. This was only awarded to four individuals in the United States, of whom Philadelphia was represented by two. The proprietor attributes his great success in his long career to the superior quality of goods produced. His artificial teeth are noted not only for their perfection in shape, color, texture, translucency and vital appearance, but also for their great strength, their lightness, adaptability, and for their resistance to variations of temperature, as ascertained by the process of soldering, in the manufacture of new dentures, or the repair of old ones. They are composed of feldspar, flint or quartz, and kaolin, and are colored with preparations of titanium, platinum and gold. Many hands are required to make a single tooth, and the number of processes before they reach the kiln would scarcely be credited by the uninformed. The large number of patents owned and controlled by the proprietor has enabled him to improve upon former efforts in his special

line, and these are continually augmenting with each successive year.

SAMUEL STOCKTON WHITE, D. D. S., was born at Hulmeville, Bucks county, Pennsylvania, June 19th, 1822, and is a son of the late William R. and Mary (Stockton) White of that place. Having lost his father when but eight years old, he aided his mother in the support of her family until he was fourteen, when he was indentured to his uncle, Samuel W. Stockton, in Philadelphia, to learn the art and mystery of dentistry, and the manufacture of artificial teeth. On attaining his majority, he commenced the practice of dentistry at the same place, and superintended his uncle's manufactory; but eventually he removed to Race street, west of Eighth, where he opened an office and practised alone until 1845. He then associated himself with Asahel Jones, who furnished the necessary capital, and subsequently with John R. McCurdy, while he contributed his knowledge, capability and energy. He, however, continued his practice for about a year, when, finding it was necessary to devote his whole time to the manufacture of artificial teeth, he relinquished office duties, and gave his entire attention to the details of manufacturing. When his partners withdrew from the firm, in 1859 and 1861, he paid each the sum of $140,000, which was considered then a fair valuation of their separate interests. The improvements in mineral teeth with which Dr. White's establishment stands credited are numerous and important. Other not less valuable advances have been the result of steady growth rather than of marked innovation; a gradual approach to perfection in many and various details. For several years the most important changes were in the direction of utility in behalf of the patient. The claims of the artist were next in order, and the contest was for effect, represented in the term "adaptability," a word used to express such a recognition by the manufacturer of the forms made necessary by the different conformations of various maxillæ, as would enable the dentist to readily adapt teeth to any case presenting, with but slight labor in fitting. Later still, the anæsthetic claims of the art began to receive greater attention; each tooth became a study. Not only were marked differences recognized between teeth which had been considered identical, but it was discovered that such a relation existed between each tooth and its fellow that one was indicated by the other in the great law of correspondence. Next in order followed the idea of complete dentures which should be characteristic of the various and distinctive needs of different sex, age, complexion, nationality, height, and other physical peculiarities. Then came close observation and faithful reproduction of minor as well as more noticeable deviations from absolute uniformity, such as imitation of the result of crowded dentition, in a tooth out of line, a twisted, lateral, or overlapping incisor, etc., giving opportunity to the skilful practitioner to produce effects which disarmed suspicion of artificiality. When to the various improvements enumerated, with many minor points not specified, consideration is given to the vast variety in size, shape, color and character which this famous establishment has provided, giving to the dentist such a wide range of selection as will allow him to provide for the necessities of every case, not only the necessities so far as speech and mastication are concerned, but as well to meet the æsthetic demands, it must be conceded that the advances in dentistry as a prosthetic art, from 1844 to the present time, have been due to a very great degree to the steady approach towards perfection in all the essential characteristics of artificial teeth which the manufactures of Dr. White have steadily exhibited. His political creed is that of the Republican party since 1856, when he voted for the Fremont ticket: he had previously been a Democrat. He was married, March 31st, 1845, to Sarah J. Carey, of Wilmington, Delaware.

MEGARGEE BROTHERS, Paper Manufacturers, Philadelphia. This firm was established in 1840, on Strawberry street, by Sylvester Jacob Megargee, under the style of S. J. Megargee & Co. The business at the commencement was almost entirely a local commission business, with some trade from the New England States; the goods dealt in being book paper and newspaper material. The first mill established was the "Doe Run" mill in Chester county. This was in 1842, and was followed, in the next year, by another one at New Hope, called the "New Hope" mill. The annual production of these two mills at that time was about 375,000 pounds of paper. In 1845, the firm became Megargee Brothers by the admission of Irwin and Theodore Megargee. While thus constituted, and from about 1852 to 1860, the firm transacted a very extensive commission business, in addition to their manufacturing operations, and also completed some large contracts with the United States Government. Their total productions at this time were about 1,800,000 pounds of paper per annum, representing a money value of some $300,000. They were then working another mill, known as McDow-



The Harrisburg Car Works, Harrisburg, Pennsylvania

ell's Mill, at Manayunk. In 1861, S. J. Megargee retired from the business, and it was continued by Theodore Megargee, in co-partnership with Patrick Doyle, A. G. Elliot and James D. Lahy. In 1869, the firm underwent another change; S. J. Megargee returned, and it was constituted as it now stands, the partners being Theodore and S. J. Megargee and Patrick Doyle. The firm have now (1874) in operation four mills; the "Spring Lawn" Mill, at Louisville, Chester county, and the "Nonantum" Mill, at Newark, Delaware, a part interest in this latter mill being held by Curtis Brothers, of Newark. The firm also work the "Dove" Mill, owned by W. & A. Mode, at Modena, a town on the Brandywine, near Coatesville, Chester county, and the mill of Harlan Brothers, near Elkton, Maryland. The "Dove" Mill produces exclusively a fine quality of paper, such as is used in the higher class of publications, the amount of the production being at the rate of about 2500 pounds per diem. The mill of Harlan Brothers, on the contrary, is devoted to the production of very coarse paper only, suitable for match and other boxes, for blasting in mines and for all purposes for which a strong, rough material is required. The general character of the paper produced by the firm at their own mills has of late years been of the finer grade, such as is used for printing chromos, fancy colored and glazed paper, and that used for the superior kinds of envelopes, etc., etc. The house of Megargee Brothers has achieved a well-merited reputation both for the extent and character of its productions, and is one of the most prominent business establishments of the city of Philadelphia.

SYLVESTER JACOB MEGARGEE was born in Philadelphia county, September 14th, 1819, his parents being Jacob and Tacey Megargee. He received his education at the common school, and, when about fifteen years of age, his father died. He then commenced work as a calico printer, and about two years afterwards was bound apprentice to a brass founder. His apprenticeship to this latter business was very quickly cancelled, and he went to Green county, Illinois, where he was employed by a large mercantile house. In 1840, he returned to Philadelphia and began the paper business.

THEODORE MEGARGEE was born in Philadelphia, April 25th, 1825. He received a common school education, and at eleven years of age entered the store of Gideon Cox, a well-known dry goods merchant, of Philadelphia. After this he served some time in a jeweler's store. In 1841, he was bound apprentice to a carpenter. He served his time at this trade, and in 1845 established himself in business on his own account. He continued thus until 1849, when he joined his brother in the paper business.

HARRISBURG CAR WORKS. This vast enterprise was mainly projected by William Calder, the present President of the corporation, and dates from the year 1853, when it was first organized. There were nine gentlemen who together subscribed the amount of capital, $25,000, necessary to establish it. The company purchased two and a half acres of ground, comprising a portion of their present site, and had facilities to turn out nine cars per week. One of the shareholders, William T. Hildrup, a practical mechanic of singular ability and rare talent—who had served for over ten years in a celebrated car factory in Worcester, Massachusetts—was called to the management. Under his care it prospered. The cars turned out then, as compared with those manufactured at the works at the present time, were vastly inferior in finish and substantial construction, although they commanded almost as high a price. Up to 1862 the original organization remained unchanged, but at this date William Calder purchased the interests of several of the stockholders and re-established the concern upon a larger basis. Having now a controlling interest in the works, he associated with himself four others and increased the amount of working capital to $75,000, and the former manager of the old concern became the superintendent of the new. The number of employés was now 250, and the works were able to turn out four large eight-wheeled freight cars each working day. There were prosperous times for the car-builders during the war, as the Government depended upon railroads for the transportation of men and material. A great many cars had been destroyed by raids and accidents of all kinds, including the not infrequent voluntary destruction of rolling stock to prevent them and their contents from falling into the hands of the enemy. Of course these had to be replaced, and the trade was lively. The works accordingly increased their capacity, and in 1864 the capital invested was $200,000, which four years thereafter was augmented to $300,000. Of course their prosperity increased correspondingly, and they were now enabled to turn out fourteen cars per day and give employment to 1200 men. Out of these works grew, first, a large saw mill; next came the foundry and machine

works, which were organized as a separate company, though being in reality, as it were, an extra dividend, the profits of the car works for a certain time being so invested. To this last enterprise succeeded a planing mill and lumber yard, costing $100,000, and also tributary to the car works. All these aggregations of interest and valuable properties are the offspring of the original germ of $25,000, invested in 1862, in connection with shrewd management, financial abilities and the development of industry. In April, 1872, the entire establishment, including all the machinery, material and manufactured stock, was burned to the ground. In a few hours the accumulations of years were reduced to ashes, involving a loss of over $500,000. While the fire was yet smouldering among the heaps of debris, the work of renovation commenced. About three-fourths of the men thrown out of employment by the conflagration were at once engaged in removing the rubbish, reconstructing the shops, or working in other establishments under the control of the company. Within ninety days after this great destruction the works were rebuilt in a far more substantial manner than originally. The convenience and quality of the framing and construction departments have been greatly increased and improved, and where formerly ten cars could be manufactured daily, fourteen can now be turned out. The capacity of the foundry and machine department has also been much enlarged. There are no less than eighteen separate and distinct buildings—nearly all of them fire-proof—erected on the six acres now belonging to the car works. No. 1 is a fine office-building, two stories high, 41 by 45 feet, containing a large room on the first floor, fitted up with every convenience, while above, on the second floor, are four apartments, in use for draughting, models, directors, etc. Two fire-proof vaults, one on each floor, are provided for safe keeping of books, accounts and valuable papers and drawings. No. 2 is the warehouse, a two story brick with slate roof, 26 by 40 feet, in which car-springs, brasses and other light material used in the manufacture of cars are stored. No. 3 is the blacksmith shop, one story high with slate roof; it is 45 feet wide and 201 feet long, containing forty-six forges, the blast being furnished by a large Demphel fan, with a capacity of 2000 revolutions per minute. No. 4 is a machine shop, two story brick with slate roof, 61 by 120 feet, containing an immense amount of the most improved machinery on each floor, including a hydraulic wheel press of 150 tons pressure, lathes, wheel-boring machines, punching-shears, planers, drill-presses, bolt-cutters and nut-tappers. The machinery is run by a line of shafting 80 feet long. In the second story, besides a vast amount of machinery, are two large Sturdevant fans—Nos. 8 and 9—driven by four 48-inch pulleys. The larger makes 2200 revolutions per minute, the smaller, 2000, and are both used to furnish blast for four cupolas in the machine and wheel foundry. Nos. 5 and 5½ are the engine and boiler house, one story brick, 40 by 80 feet, containing two steam engines, one of eighty horse and the other of fifty horse power. The former drives the machinery in the machine shop, the latter in the framing department. The belt revolving around the fly-wheel of the larger engine and main pulley is 2 feet wide and 87 feet 8 inches long, and cost $657. No. 6 is the foundry-office and storeroom. No. 7 is the foundry, a one story building with a slate roof, divided into three departments—the machine foundry, cleaning and wheel-pit house and the wheel foundry, beside having a core-oven attached, 12½ by 18½ feet. The entire building is 220 feet long. Smelting capacity 15 tons of castings per day. There are forty-five pits in the pit-house; each pit can receive seven hot wheels for the purpose of cooling; the process occupies three days. The capacity of the wheel foundry is 120 wheels per day, 33 inches in diameter and weighing 560 pounds each; the smaller size weigh 440 pounds. No. 8 is the paint house, 20 by 30 feet. No. 9, temporary office. No. 10 is the construction shop No. 1, and the only frame building on the ground. It is 60 feet wide and 232 feet long. Three railway tracks run through the building. The capacity here is seven eight-wheeled cars per day. No. 11 is the framing shop, 60 feet by 200 feet, containing four planers on the first floor, cross-cut and rip-saws and various other valuable machinery on the same floor, as also on the second floor, which also is occupied as a pattern and carpenter shop. No. 12 is the construction shop No. 2, a one story brick, 60 by 200 feet, with three railway tracks running through it. It can turn out seven flat cars each working day. No. 13 is the repair shop, 38 by 101 feet, one story high. No. 14 is the bolt shop, a one story brick, 30 by 40 feet, containing three bolt-heading machines, driven by a small horizontal engine of fifteen horse power; the capacity is 6000 bolts per day. Here is also a pair of shears weighing three tons, capable of cutting iron 6 inches broad and an inch thick. No. 15 is the rattler house, two stories high, 23 by 26 feet, in which is a hollow cylinder which receives the small castings mixed with cinder, and slowly revolving removes the rough surface. No. 16 is a core-oven, 14 by 26 feet. No. 17 is the dry-house, 20 by 26 feet, tin roof, where lumber is dried by

W. J. Hildrup

steam. No. 18 is a building, 12 by 16 feet, for the use of car inspectors. These works are probably the largest of the kind in the country. Their annual capacity exceeds 4000 eight-wheeled flat cars. Their substantial character and the cheap prices at which they are sold have rendered the works very popular. They have furnished the New York Central Railroad as high as 1000 cars per annum. They also do a large amount of work for the Pennsylvania, Northern Central and other railroads. The average price of cars manufactured here is $850. The company employs several car inspectors, whose business it is to examine all freight cars stopping there. If defective, they are detached from the train and removed to the repair shop, where they are placed in condition for the road. The railroad company owning the property is charged a certain sum for every car inspected, and additional rates for cars repaired. The company has on hand constantly over 500,000 feet of Southern yellow pine, an article immeasurably superior in toughness and durability to that obtained in Pennsylvania, which is used in all the cars manufactured by them. When the works are run to their fullest capacity, 35,000 feet of lumber, 25 tons of wheel iron, 15 tons of car iron, 7 tons of axles and 15 tons of common pig-iron are daily consumed. In 1873, and prior to the panic of that year, 1400 men were employed, and 14 cars were produced daily. The capital stock is now $300,000, and the principal stockholders are W. T. Hildrup, the Superintendent (who owns the largest number of shares), William Calder, the President, J. R. Eby and David Fleming.

HARRISBURG FOUNDRY AND MACHINE SHOP. This establishment is the direct offspring of the Harrisburg Car Works, although organized as a separate corporation. It was originated and also brought into successful operation by the careful management and experience of William Calder, who was also its President for a number of years. Twenty-two acres of land were secured for the purpose, and a railroad built for its own necessities, costing $36,000. From 300 to 400 men here found employment, and as the years advanced this force was gradually increased. In 1872, the car works were burned to the ground, and in ten days thereafter the foundry and machine works, by a singular coincidence, suffered a like fate. Three days only were allowed to elapse when they were in working order again. The capital at first invested was $300,000, which was subsequently increased to $500,000, and then reduced to $400,000. The business was a general iron manufacture, giving employment to 600 hands and producing 100 tons per day. Railroad and bar iron was the principal yield, but at a later day, when a furnace was added to the establishment, pig-iron was also produced.

HARRISBURG COTTON MILLS. These mills were originally established with a capital of some $25,000. They commenced operations and continued for about three months, when, through lack of the necessary pecuniary means combined with energetic management, they fell behind and gradually declined. At this time William Calder, with a friend, stepped in, and in a short time raised the sum of $300,000, thus firmly establishing the concern, and new vigor and life being infused into the same they became a decided success. They give employment to some 350 hands, and are still carried on by the same parties, principally with the generous and charitable object of keeping this class of hands so employed.

WILLIAM THOMAS HILDRUP was born in Middletown, Connecticut, February 6th, 1822. He received a common school education, and at an early age learned the carpenter's trade. When nineteen years old, he repaired to Worcester, Massachusetts, the possessor of a set of carpenter's tools and $25, which, with his energy and industry, has made him what he is. For ten years he was employed in Bradley's Car Factory, becoming a perfect master of the business. He was a studious man, and his leisure hours were devoted to the perusal of such works as pertained to his calling, thus combining the theoretical with the practical. In 1852, he went to Elmira, New York, where, after a year's residence, he changed to Harrisburg, as above noted. He is now taking an active part in the organization of the Mechanics' High School, an institution designed to educate the artisan so as to make him a proficient in his particular sphere or calling.

WILLIAM CALDER was born in Harrisburg, Pennsylvania, July 31st, 1821. His early educational advantages were very limited, as his father, who was a veteran stage proprietor, took his son at the age of twelve years only and put him in the way of learning the business. So proficient was he that, when but sixteen years old, he took the entire charge of the "Pioneer Packet Line," running from Columbia, Pennsylvania, to Pittsburgh. In 1851, he succeeded to his father's business of stage coaches, and at his death, in 1861, assumed much greater responsibilities. During this year also, the

first of the late civil war, from his great knowledge of horses, their dealers and owners, he was able to fill an order for 400 fine animals, needed at once by the Government, which was effected within the seventy-two hours, himself contributing seventy-five head from his own farms. During the entire war, he furnished the Union army with 42,000 horses and 67,000 mules, beside thousands of tons of hay, etc., and effected a saving to the Government of hundreds of thousands of dollars, resulting from his determination in disallowing the high prices demanded for the animals and bringing down the rate to $125 for horses and $117 for mules, himself receiving a small commission from the traders. He is prominent in many enterprises beside the one above named, being concerned in the Harrisburg Cotton Mills (the Harrisburg Car Works), the Harrisburg Foundry and Machine Shop, Fire Brick Works, etc. He was a partner in the banking firm of Cameron, Calder, Eby & Co., which, when the national bank system was adopted, became the First National Bank, of Harrisburg, and of which he was President for several years, having previously been director of the old Harrisburg bank for six years, and also a director of the Central Insurance Company. He has been a member of the City Council for one term, but never sought office. In 1873, he organized the Harrisburg Hospital, and by his determined efforts in its behalf it is now established on a firm footing. He is a trustee of the Insane Asylum, and also of the Home of Friendless Children, both of which institutions owe much to his charity and labor.

JACOB RUPLEY EBY, one of the Board of Directors, was born near Columbia, Pennsylvania, November 18th, 1816, his parents being members of the Mennonist faith. He was educated in the common schools of the day, and when fifteen years old was placed in Strickler's store, at Columbia, where he remained eighteen months. He then was apprenticed to learn the carpenter's trade, serving three years and earning $80 per annum. After this he went South, working his way as far as Vicksburg, which he reached in the fall of 1836. He remained there eight months, laboring at his trade, and saved some $225. He now returned home, and, accepting a clerkship in a store, abandoned his trade. While thus engaged, he was tendered the clerkship of the board who directed the building of a dam at Columbia, and so relinquished the store. On the completion of this improvement he became interested in the lumber business, at Middletown, and at the expiration of six years disposed of his interests to advantage. With his brother, E. C. Eby, he embarked in the grocery, provision and shipping business, in Harrisburg, which laid the foundation of his present large fortune. He is interested also in the Lochiel Iron Works and other enterprises, and is President of the First National Bank, of Harrisburg, also of the State Agricultural Society.

DAVID FLEMING, also a director of the Harrisburg Car Works and one of the original founders, was born in Washington county, Pennsylvania, July 17th, 1812, of Scotch-Irish ancestry. He accompanied his parents to the neighborhood of Harrisburg, and from early childhood labored on his father's farm during the summer, and attended school during the winter season. At seventeen years of age he became a teacher, and so continued for several years, alternating with attending school himself, and so acquired a fair academical education. His health becoming impaired, he accepted a clerkship with a contractor who was furnishing ties for the Baltimore & Port Deposit Railroad, then being constructed; and subsequently yellow pine timber for the Washington Navy Yard, he superintending the shipment of the same from North Carolina and acting as supercargo on several voyages. In 1838, he returned to Harrisburg and became reporter, for several Philadelphia journals, of the Legislative proceedings. This he continued for several years, beside editing a local paper. He also, during this period, studied law, and was admitted to the bar in November, 1841, and has ever since practised his profession in Harrisburg. In 1847, he ceased acting as journalistic correspondent, having been elected Chief Clerk of the House of Representatives, serving during that session. In 1854, he was elected District Attorney, and filled that office for the three years term, declining a re-election. In 1863, he was elected to the State Senate, where he served three years, and during his closing year was chosen Speaker of that body. Besides being closely identified with the Harrisburg Car Works, he is interested in many other enterprises, among which may be named the Lochiel Iron Works, the Lochiel Rolling Mills, the First National Bank, Keystone Life Insurance Company, Cash Mutual Fire Insurance Company, Harrisburg City Passenger Railway Company, and has been counsel for many of the leading telegraph companies in the Union.

WILLIAM JAMES STEES, Superintendent of the saw mills and lumber yards of the Harrisburg Car Works, was born in Cumberland county, Pennsylvania, January 13th, 1832, and is the son of

Wm. Calder

Henry Stees, a miller by occupation. He was educated in the common schools of the district where he resided. When but eleven years of age, he started as a salesboy in the Harrisburg market. He next engaged with one J. B. Simons, at $2.50 per week, and so continued for three years. He then was occupied as a journeyman for a considerable period, and at length obtained a large contract in Philadelphia, which required some 600,000 feet of lumber to be used in filling the same. He started on a cash capital of $40, and was so successful that he returned in three months with $3000 profit. He subsequently undertook various other contracts of considerable magnitude, which he carried through with equal success, and all without any cash capital. His enterprise and alertness were so conspicuous that many agricultural societies gave him contracts, which he carried through with honor and credit to himself. In 1871, he was offered the position which he at present holds, as he was deemed eminently capable of directing the heavy operations carried on by the car works at their extensive saw mills and lumber yards. The establishment occupies about three acres of surface and gives employment to some twenty-five hands. About 5,000,000 feet of lumber are turned out every year, and contracts are taken throughout the State. The most improved machinery is in use, and every ingenious contrivance is employed to give enlarged facilities for carrying on the business. The entire surroundings of the establishment, as well as the mill itself, give evidence of thorough, careful and efficient management, and the determination to not only keep pace with, but to be, if possible, in advance of the times. His responsibility is a great one, but he is a hard-working, industrious man, perfectly reliable and withal of shrewd business habits. He is a constant attendant and member of the Presbyterian Church. He was married, in 1854, to Ellen Jackson, of Harrisburg.

HENRY HANDSHAW, Assistant-Superintendent of the car works, was born in Dauphin county, Pennsylvania, in 1827, and is a son of John Handshaw, of the same locality. Until he had attained the age of seventeen years he labored on a farm; and then betook himself to a carpenter's shop, where he learned that trade. After working for some time in this calling, he accepted a position, in 1849, in the pattern shop of the Novelty Iron Works, where he remained between two and three years. In 1853, he entered the pattern department of the Harrisburg Car Works, and making the same his particular study became a proficient in this branch of the business. Subsequently, he took charge of the Car Department, and in 1861 became General Foreman. In 1868, he was appointed Assistant-Superintendent of the works; although his duties were not materially changed, yet they were much increased, as the business was augmenting rapidly. The position is such as to require the services of a superior mechanic, possessing great administrative and supervising abilities, to conduct so large an establishment in its various details. Such is his sphere of duty, and he is eminently qualified for the same, as he possesses industry, capability and skill, proving himself at once entitled to the confidence which has been reposed in him by the company, while, at the same time, he commands the respect and esteem of his subordinates.

JOHN MURPHY, Agent of the car works, was born in the county Wexford, Ireland, in October, 1830, and was engaged as a farm laborer until 1848, when he emigrated to the United States. Having reached Harrisburg, he became at first a salesman in a grocery store, from which he entered a carpenter's shop to learn that trade. When the Harrisburg Car Works first commenced operations, he effected an engagement and remained in the establishment until the civil war broke out, when he left, to resume his occupation some years later. He has filled several important positions, at different periods, and finally was appointed agent of the company. In this capacity he has made heavy contracts with representatives of different railroad companies to build, at the works, a large amount of rolling stock; within the past three years he has effected contracts with Vanderbilt, of the New York Central Railway, for over 4000 cars. He is also intrusted with heavy purchases of lumber and other material used in the works. He is an excellent business man, of genial disposition and universally respected.

JAMES K. BOYER, Accountant and Cashier of the car works, is a native of Harrisburg, Pennsylvania, where he was born, in the year 1814. He is the son and only child of George Boyer, formerly of Berks county, but who, at an early day, removed to the capital city of the Commonwealth, and there continued to reside. James was educated in the common schools of the town, and when quite young was apprenticed to learn the printing business, which, in connection with publishing, he followed for eighteen years, and was at one and the same time editor and proprietor of four different newspapers. In 1853, he relinquished these

callings to accept the position of accountant to George S. Repplier, who was extensively engaged in the mining and shipping of coal. His engagement with that gentleman lasted seven years, during which time he proved himself an industrious, capable and faithful employé. He next removed to the city of Chester, and, after sundry changes of fortune, returned to Harrisburg, in 1870, and was at once appointed Accountant and Cashier of the Harrisburg Car Works. In this position he has shown large financial ability, and has performed his official duties with marked faithfulness. He manifests a great interest in political matters, and is very influential in his party, and was the first person to recommend Governor Bigler as a candidate for the Executive office. Though a politician from pure patriotic motives, yet he is no office-seeker; he has been frequently importuned to accept a public position, but has invariably declined a nomination.

GEORGE G. BOYER, Chief Clerk of the car works, was born in Harrisburg, in 1842, and passed his early life in Carlisle and Pottsville. When the war broke out, in 1861, he assisted in organizing the first regiment that left the State, and was commissioned a Lieutenant of Company K. He was made regimental Adjutant, and served in all the campaigns of the Army of the Potomac. He elicited favorable and honorable mention from his commanders both at the battles of Gaines' Hill, June, 1862, and Crampton's Pass in the following September. After the close of the war, he was variously employed until the spring of 1868, when he was invited to Harrisburg, made Chief of Police, and organized the first uniformed police force and the first city patrol successfully and satisfactorily. In 1871, he accepted the Chief Clerkship of the Harrisburg Car Works, and has since held that position and has general supervision of the office department, keeping up supplies, etc.

GREENVILLE IRON COMPANY. The partners associated together under the above title consist of J. M. Mordock, Luther McGilvray, S. P. Thompson and James M. Ewing, who, in 1871, erected their works about half a mile south of the borough of Greenville, Mercer county, Pennsylvania, between the lines of the Pittsburgh & Erie Railroad and the Atlantic & Great Western Railway. The premises contain twenty acres of land, upon which are erected the mill and ten tenement houses for the accommodation of employés. The mill measures 165 feet in length and 130 feet in width, and contains ten boiling and two heating furnaces, with three trains of rolls, driven by one engine. The manufactures consist of hoop and bar iron and an improved patent car-link and pin, the invention of the firm. During the first year that the mill was operated, there were fifty-five hands employed, and the product amounted to about 2000 tons. At present the working force numbers eighty men, and the manufactures aggregate 3800 tons per annum, although the mill has a capacity for 6000 tons. The works are being constantly enlarged, two additional boiling furnaces being now in process of erection, and other improvements being contemplated.

LUTHER McGILVRAY, Superintendent of the above works and part owner of the same, was born in Allegheny City, Pennsylvania, in 1833, where also he received his education. In 1851, he entered the employ of the Old Sharon Iron Company as a rollsman, where he remained until 1855, and thence removed to Youngstown, Ohio, where he effected an engagement with Bower, Bronwell & Co., for whom he labored for seven years. In 1862, he repaired to Sharon, Pennsylvania, and became an employé of the Westerman Iron Works. Here he remained until 1871, when he proceeded to Greenville, and in connection with the gentlemen named at the head of this article established the works of which he is the present manager. He was married in 1853, and is a resident of Greenville.

UNION IRON FOUNDRY, of which Thomas Green and James Linehan are proprietors, was established in 1865, and originally located at the corner of Main and Adam streets, Frankford, Philadelphia. It was devoted to the manufacture of iron castings and a general jobbing business, and was started on borrowed capital. Both being practical men and experienced artisans, and withal possessed of industry, perseverance and energy, they could not fail of being successful. They remained at this locality until 1869, when their establishment was destroyed by fire. It had already become too circumscribed for their operations, hence they removed to the premises now occupied by them, at the corner of Adam street and Kensington avenue, the lot being 150 feet square, equalling a half acre. Here they fabricate engine castings and wood

working castings, the capital now invested being $30,000. They give employment to about forty hands.

THOMAS GREEN was born in Frankford, Philadelphia county, Pennsylvania, in 1832, and received his education in the common schools of that borough. When but twelve years of age he commenced work, and served an apprenticeship in the establishment of Alfred Jenks & Son, remaining there some ten years. He subsequently became a conductor on a railroad, and followed this arduous duty for eight years, after which he started his present business.

JAMES LINEHAN was born in Ireland, in 1843, and when five years old his parents emigrated to the United States, finally settling at Frankford. He was at an early age indentured to Bement & Sons, where he learned the moulding business and became an experienced workman. Soon after his term of service expired, he entered into partnership with Thomas Green, with the result as already stated.

D. & J. NOBLIT, Manufacturers of Hair Cloth, Philadelphia. In 1849, Dell Noblit, Jr., the founder of this firm, engaged in the upholstery and furnishing business at (old) No. 83 South Second street, where he embarked on a most prosperous career, receiving among his first orders one from the well-known and highly respected Captain Loper, for the complete equipment, with all essentials in his line, of several ocean steamers, then in process of construction. This order he carried out to the entire satisfaction of the owners, and from that time onward his success was assured. His business increased almost from the beginning with a rapidity which compelled him to seek a partner, whom he found in his brother, John Noblit, their association proving for both a judicious measure and peculiarly fortunate in its results. Soon after the formation of the partnership, their attention was called to the weaving of hair cloth as a branch of their business which promised to become of the first importance. At that time, although an immense quantity of hair cloth was used in America, very little of it was of home production, the market being supplied chiefly from Germany and England. D. & J. Noblit, for such was the firm name, believing that it could be made in Philadelphia, commenced its manufacture by hand; but their resources were soon drawn upon to so great an extent by the rapidly increasing demand that they began to consider the necessity of having recourse to steam. In 1856, a site for a factory was secured, and their building, at Jefferson and Randolph streets, erected. Fifty looms were put into the new structure, and the manufacture of hair cloth was begun and conducted on an extensive scale—a manufacture that has ever since held its place in the American market. In the management of their large store, on Second street, south of Dock, they found it necessary to have a partner, and associated with them in that portion of their business Willard S. Brown, under the firm name of Noblit, Brown & Noblit.

DELL NOBLIT, JR., was born, September 21st, 1825, in Wilmington, Delaware, where he passed his boyhood years and was for some time a clerk in a dry goods store in that city. When nineteen years old, he went to Philadelphia, and entered the establishment of Finley & Co., where he became thoroughly conversant with the business of furnishing; and, being economical and saving, laid by sufficient to enable him to start on his own account in business at the age of twenty-four. He has been a member of the Board of Directors of the Corn Exchange Bank from its inception, and when President Cattell resigned from this post, Mr. Noblit was unanimously elected to succeed him, and has filled the office with signal ability.

THE ENTERPRISE MANUFACTURING COMPANY OF PENNSYLVANIA was incorporated September 8th, 1866, and originated from the old firm of Henry Asbury & Co., which gentlemen are the mechanical superintendents of the concern. The first location of the company was at 402 Library street, Philadelphia, and employed at the outset some fifty hands, who were engaged in the manufacture of patented and special articles for the hardware trade. From the merits of the goods produced and the rapid demand they acquired, together with the shrewd and business-like accomplishments of the management, the premises then occupied became entirely too circumscribed for their operations, and they were compelled to change their locality and erect their present commodious building, at the southwest corner of American and Dauphin streets, having a frontage of 150 feet on the former and a depth of 228 feet on the latter street. Since the erection of this large edifice, which is three stories in height, the

company, in 1873–'74, extended their limits and built two store-rooms and a cleaning room for castings. The entire establishment now covers one complete square or block. In the yard is to be seen a large amount of A No. 1 pig iron, none but the very best quality of metal being employed. In the foundry are thirty-six moulders (bench and floor), running from 14,000 to 15,000 pounds of iron per day. On this floor is also the casting-cleaning department; also sixteen churns or tumbling machines, invented by this company, for smoothing the surfaces of castings. Here is also situated the pattern safe room, which contains all the brass patterns from which the work is cast. This collection of patterns is valued by the company at $10,000. The basement is occupied by emory grinding machines and bins for various castings. There is also a well here which supplies the entire establishment with pure water for drinking and other purposes. On the first floor of the main building is located one of Wilbraham's thirty horse power engines, with a forty horse power boiler, doing their allotted work in furnishing the motive power to all the labor-saving machinery in the buildings. On this floor, also, there is a finishing department, and on the second floor another used for the same purpose, and also a japanning department for black work. A section of this floor is devoted to the packing and shipment of goods to their various destinations. On the third floor is another japanning room for colored work, where the articles are finely elaborated in the most artistic and finished style. Most of this work is done by women, who are quite adepts in the art. On this floor, also, is another finishing room; likewise the carpenters' department, which furnishes the wood patterns for the foundry. A tank holding 1100 gallons of water is also located on this floor. The entire buildings are lighted with gas, and supplied with steam pipes for heating purposes; there is also a steam elevator and other appliances for the ready transaction of business. As before remarked, the articles manufactured embrace specialties in the hardware business which are covered by letters patent. These are various drug, coffee, and spice mills of different sizes, to be propelled by hand or steam power; "The Patent Suction and Force Measuring Faucet, Improved," for the correct measuring of molasses, heavy oils, varnish, etc. Over 150,000 of these are in actual use throughout the country. The "Enterprise Champion Molasses Gate;" the "Improved Bung-hole Borer, or Hollow Auger;" the patent "Self-weighing Cheese Knife;" the "Champion Tobacco Cutter, Improved;" the "Enterprise Champion Saw Set;" the "Sash Fastener and Anti-Window Rattler;" the "Enterprise Barn-door Bolt;" the "Portable Coffee Roaster;" and "Mrs. Potts' Patent Cold Handle Double-pointed Smoothing Iron." Employment is now given to 140 hands, and the business has increased annually from twenty to thirty per cent. The present cash value of products is over $200,000 for the year.

MARSHALL BROTHERS & CO. The building owned and occupied by this firm, in the manufacture of galvanized iron, is located at No. 24 Girard avenue, corner of Leopard street, Philadelphia. It is a two-story brick structure, having an area of 10,800 square feet, and the lot on which it stands has a frontage of 90 feet on Girard avenue, and on Leopard street of 200 feet. In the rear portion is the department in which the galvanizing and general mechanical operations are performed. On the first floor front are the capacious business offices of the firm, separated by an entrance way leading to the large intervening space occupied as a wareroom. The second story is used for the storage of refined iron. The sheet-iron, which is here submitted to the galvanizing process, is manufactured by them at their rolling mill, situated on the corner of Beach and Marlborough streets, where they employ a force of 175 hands. In their galvanizing department there are employed about 30 hands. Their yearly product in sheet-iron is in excess of 1800 tons, and in bar-iron about an equal amount.

CALEB MARSHALL was born in Chester county, Pennsylvania, September 11th, 1806. His father, Robert Marshall, was a farmer by occupation, and young Caleb was employed at home in the same pursuit, till he reached the age of about seventeen years; obtaining during this time a good common-school education, by his attendance at the district school during the winter seasons, and his close application to his studies. He was then put to labor in his father's flouring mill. Some time after the attainment of his majority, by personal industry and economy, he acquired an interest in the mill, in which he zealously labored till 1846. In 1835, however, he, in conjunction with his brother John Marshall, purchased a property on Red Clay Creek, in New Castle county, Delaware, on which was a flouring mill. They immediately commenced the erection of a rolling mill. The following year it was completed and put in active operation under the immediate supervision of his brother. In 1845, he was married to Jane Thompson, a native of

Delaware. The succeeding year he disposed of his interest in the flouring mill in Chester county, and removed to the location of their rolling mill in Delaware, to join his brother in personal attendance upon their iron manufacture; which, by judicious management, had grown into a large and lucrative business. In the fall of 1856, they received into partnership Calvin Phillips and Alexander H. McFadden, and commenced the manufacture and galvanizing of iron in Philadelphia, under the firm-name of Marshall, Phillips & Co. Their rolling mill was located where it now exists, though their galvanizing operations were then carried on in a building on Front street. In 1863, Caleb Marshall sold out his interest in the Delaware manufactory, and removed with his family to Philadelphia. In 1865, they purchased the Girard avenue property, and erected the building occupied by the present firm, whence they removed from Front street during the fall of the same year. On January 1st, 1873, the firm of Marshall, Phillips & Co. was dissolved by reason of the death of Calvin Phillips, which occurred on September 18th preceding, and the son—Alfred Marshall—was made partner in the business, constituting the present firm of Marshall Brothers & Co. Alexander H. McFadden, who for many years has had personal charge and management of the mechanical department at the rolling mill, has had a partnership interest in the business since its organization. In the autumn of 1871, they erected a large furnace at Newport, Pennsylvania, widely known as the "Marshall Furnace," in which they carried on extensive operations till January, 1873, when it was sold to Eagle, Schultz & Co.

JOHN MARSHALL was born in Chester county, Pennsylvania, October 7th, 1808, and is a brother of Caleb. He was educated principally in the common country schools, but attended the select school at West Chester for a brief period, after which he worked on his father's farm until he reached the age of seventeen or eighteen, when he went to learn the milling business. He married Sarah, daughter of John C. Phillips, of New Castle county, Delaware, November 25th, 1831, and in the spring of 1832, rented a mill in Chester county, Pennsylvania, and commenced business in a small way. He removed to Delaware in 1834, and in 1835, united with his brother in the purchase of the Red Clay Creek property, where he superintended both the rolling and flour mills until relieved of the former by his brother, in 1846. His son-in-law, Edward Mendenhall, purchased the interest of his brother Caleb in the Red Clay Creek property in 1863, and the firm became J. Marshall & Co. In 1864, he was succeeded by his son, Calvin P. Marshall, and removed to Philadelphia, but retained an interest until January 1st, 1873, when he disposed thereof, as well as his rolling mill at Newport, Delaware, which he had erected in partnership with his son, to John and Joseph Richardson.

Caleb and John Marshall are justly entitled to honorable positions in the ranks of our self-made men. They have hewn their way by their own unaided efforts from their humble labors as farmer boys to their present high positions in social and business circles. They have been the inventors and introducers of many decided improvements in the manufacture of sheet-iron, which, by reason of their not applying for patents on them, have been universally adopted. Among these improvements may be mentioned the manufacture of sheet-iron from chilled rolls, and also out of pulled iron. They were also the first manufacturers who applied circular shears in trimming, and the first to finish by annealing and pressing.

ALFRED MARSHALL, the second son and second partner of the firm, was born in Delaware, October 29th, 1848. During his early boyhood he was sent to the public schools of his native town; and on the removal of his parents to Philadelphia, he entered one of the high schools of the city, where he pursued the study of the higher English branches for a period of two years. In the summer of 1867, he entered his father's counting-room as head bookkeeper, and during the last two years preceding his admission to a partnership, he had charge of the financial department of the business, which responsible position he still holds, performing its duties with marked discretion and ability.

LANGHORNE WISTER, Iron Manufacturer, Philadelphia, was born in Germantown, Pennsylvania, September 20th, 1834. He is a son of William Wister, Treasurer of the North Pennsylvania Railroad Company and President of the Duncannon Iron Company; the latter being a grandson of John Wister, who emigrated from Heidelberg early in the eighteenth century, settled in Pennsylvania, purchased land, and entered successfully into business at the place where he located. His mother was a daughter of William L. Fisher, a prominent and successful woollen manufacturer of Germantown, and the founder of the Duncannon Iron

Company; the latter was a grandson of James Logan, the founder of the Loganian Library and William Penn's confidential secretary and most intimate friend; also a grandson of Owen Jones, the first Treasurer of Pennsylvania. Langhorne Wister was educated at the Germantown Academy, whence he graduated at the age of eighteen years, and subsequently entered into the employ of the Duncannon Iron Company as time clerk. In this capacity, and in others to which he was promoted from time to time, he ever zealously labored to further the interests of his employers, and had in six years attained the position of chief clerk, which he held until the spring of 1861, when the civil war broke out. He then resigned, and entered the military service, raising a company, which was accepted April 19th, 1861, and of which he was commissioned Captain by Governor Curtin, and was assigned to the First Rifle Regiment of the Pennsylvania Reserve Corps ("Bucktails"). About the middle of May they were ordered to Piedmont, West Virginia, under the command of the late Colonel Charles J. Biddle (afterwards of the *Age*), where they remained until after the disastrous battle of the first Bull Run, and then proceeded under orders to assist in the protection of the capital. Early in December of the same year they participated in their first battle—that of Dranesville—and which was the first successful battle fought by the Union soldiers east of the Alleghenies. The regiment lay in or near Washington the greater part of that winter, and in the spring of 1862 were ordered to Fredericksburg, under command of General McDowell; but were subsequently detached, and then joined the main army of General McClellan in front of Richmond, at the close of June. Soon after their arrival the "Bucktails" participated in the battle of Mechanicsville, Captain Wister's company—then on picket duty—firing the first shots. Following this contest, in rapid succession, came the battles of Gaines' Mill, Charles City Cross Roads, Malvern Hill, and Harrison's Landing. At the battle of Malvern Hill he was severely wounded in the ankle, but refused to leave the field, and being allowed a horse, participated in this and the battle of Harrison's Landing which followed. Near the close of July he proceeded to Philadelphia on recruiting service, and in one month returned to Washington, having raised the 150th Regiment, of which he was commissioned Colonel, August 25th, 1862. In the spring of 1863, the regiment was ordered to the Army of the Potomac, and soon after participated in the battle of Chancellorsville. Subsequently, at Gettysburg, the brigade commander having been wounded, Colonel Wister assumed command of the Second Brigade, Third Division, First Army Corps, and was himself wounded in the jaw in the first day's fight. His regiment went into the combat numbering 450, and at its close was reduced to but 150 and two commissioned officers fit for duty. After four weeks' leave of absence he returned to duty, took command of a brigade, which he retained until his resignation, February 13th, 1864. On the recommendation of General Abner Doubleday, he was commissioned Brevet Brigadier-General by President Johnson, for conspicuous gallantry and daring at Gettysburg and elsewhere; and General Doubleday also made special mention of him in his official report of the battle of Gettysburg. After leaving the army, he entered into the manufacture of pig-iron at Duncannon, in which he has been very successful. He has also devoted much time and attention to agriculture, that being one of his favorite pursuits. He is not an active member of any religious society, but his inclinations are towards the faith of his forefathers, that of the Society of Friends. In politics he is a Republican.

DANIEL M. KARCHER, Manufacturer of Fine Furniture, Philadelphia, was born in Freedensburg, Schuylkill county, Pennsylvania, November 9th, 1823, and is a son of Daniel and Catharine (Schartz) Karcher of that place. His father was a native of Berks county, and had been in his earlier years a farmer, but at a later period became a mechanic. He was a worthy man, and of extensive business experience. He was at one time a railroad contractor, and constructed a portion of the Philadelphia & Reading Railroad, from which, however, he did not reap any pecuniary advantages; but he fulfilled his agreements with that corporation, met all his engagements promptly, and though he made no profit, preserved his name and honor untarnished. He died in Philadelphia at the age of sixty-five, leaving an unsullied record behind him. Daniel M. Karcher had but a limited education, as the schools of Schuylkill county of 1830 were not what they are at the present day. When twelve years of age he began to labor in the colliery and at boating, and so continued for six or seven years; during the latter portion of this period he received the same wages as an able-bodied man. Being desirous, however, of learning a trade, and his father acquiescing with his wishes, he was in his nineteenth year apprenticed to a cabinet-maker, and remained during the rest of his minority in this calling, ap-

plying himself with earnestness and constant industry, endeavoring to perfect himself in his calling. In April, 1845, he went to Philadelphia, as the field was wider, and the city possessed superior advantages; but though he was willing and eager to work, received no encouragement, his youthful appearance and want of means being regarded as obstacles. For one whole month he walked the streets, but could find no one to employ him. At last he met George J. Henkel, for whom he commenced working without remuneration. The position proved a good one, and in about three years he became his foreman; there being 100 hands employed, and the factory having the largest custom in the city. He commenced the business with a partner in the fall of 1845, but owing to causes beyond his control it did not prove successful. In the spring of 1857, he purchased the business on credit, and without any capital save his experience and his energy. He had severe difficulties to contend with, both from his former partnership, indorsing, etc.; but made strenuous efforts to sustain his credit, and was successful, being enabled to pay every dollar of his liability and indebtedness. On commencing business, he resolved to manufacture nothing but the best quality of furniture; and though he did not seem to prosper for the first six years, yet he always felt that the course he adopted was the wisest to pursue. The good seed then sown has produced an abundant harvest, and customers often assure the house that the article made and purchased long since is to-day as good as when first bought. In 1858, business improved, and he realized the value of a good reputation for his products. In 1861 and 1862, it assumed heavy proportions, almost doubling itself month by month, and this continued until 1865. During all this period, he observed the same care and attention as when he first commenced. The sales have since the last-named date continued as satisfactory as ever, and he escaped unscathed during the financial panic of 1873. In the factory employment is given to some sixty-five workmen; there is also a considerable amount of the most approved labor-saving machinery on the premises. The furniture is all made from the raw material; the lumber after being purchased is thoroughly seasoned before it is made up: all the upholstering work is likewise done in the factory, and the articles finished complete and ready for the salesroom. The business is now conducted by his two sons, Edmund J., aged twenty-five, and James D., two years younger, who are possessed of the best business qualifications, and, like their father, are upright, honorable, and trustworthy. During his whole business career, their father took the personal supervision of his factory, was his own foreman and principal salesman. His political creed was Republican, and his family has ever been a patriotic one. During the War of 1812, his father served in the army; two of his brothers were in the war with Mexico, and two cousins died there in the same campaign. From his twentieth year he was an active member of the Methodist Episcopal Church, and was a Trustee of the same for eleven years prior to his death. From principle, he was ever a temperance man, and escaped many a temptation in his youth and early manhood by his appreciation of the force or strength that resides in the word "No." His first wife was Susan Kinesman Wilson, who was the mother of the two sons above mentioned. She died, June 29th, 1851. His second wife, Deborah S. Brooks, to whom he was married April 5th, 1859, brought him three children. He died, November 24th, 1874.

J. P. REIFSNEIDER, Manufacturer of Lounges and Parlor Furniture, was born in Montgomery county, near Pottstown, Pennsylvania, August 3d, 1822. While quite young he lost his father, and at the age of four years was taken to Berks county, where he became an inmate of the family of Christopher K. Shultz, working on the farm or tending the store belonging to the latter, until he was nineteen years old. His education was acquired, meanwhile, in the common schools of the district. Having resolved to learn the trade of a cabinetmaker, he went to Pennsburg, Montgomery county, where he served a three years' apprenticeship at the business, remaining another year also with his employer, Gerhardt, as journeyman. In 1844, he proceeded to Philadelphia, where he found employment in his line, and worked for about six months, when he associated himself with two partners, who formed the firm of Buck, Bossert & Reifsneider, for the manufacture of furniture, their place of business being on Front street, north of Poplar street. They continued prospering and increasing their products and sales until 1849, when the first-named gentleman withdrew, and the firm was changed to Reifsneider & Bossert, continuing at the same locality until 1850, when, meanwhile, having erected a building at Fourth and George streets, they removed thither. At the same time they opened a wareroom on Sixth street, south of Cherry street, for their retail sales. Here they remained three years, and next removed to "Brock's Building,"

on Third street, north of Callowhill street. This was a five-storied double structure, which was entirely occupied by them, and closed the Sixth street store, retaining, however, the building at Fourth and George streets for factory purposes. In 1855, they disposed of their Third street establishment, and opened another at No. 207 North Second street, where they remained until 1858. Prior to this latter date—in 1857—they started a store on Second street, south of Poplar street. In 1858, they dissolved partnership. Reifsneider retained the establishment last named, where he commenced the manufacture of lounges with other furniture. Towards the close of this same year, he disposed of this concern and removed to a four-storied building at Rachel and Poplar streets, where he engaged exclusively in the manufacture of lounges. In 1861, the premises were destroyed by fire, necessitating another change of base. He next located at Germantown avenue and Canal street, and in 1864 rented a portion of the mill at Sixth and Oxford streets, for factory purposes, which he still holds. In 1869, he erected a handsome four-storied building, 47 by 65 feet, at Marshall and Oxford streets, and after its completion removed to the same from the Germantown avenue concern. The principal portion of the manufacture is carried on at the mill. at Sixth and Oxford streets, where steam power is employed, the building at Oxford and Marshall streets being entirely devoted to the finishing department and warerooms. When he commenced, in 1858, he had but two hands in addition to himself; he now gives employment to fifty men. He was the first person in Philadelphia to manufacture lounges exclusively, and he turns out about 100 every working day. In July, 1872, he introduced the manufacture of parlor work, in addition to his specialty.

HANNIS DISTILLING COMPANY OF PHILADELPHIA, Henry S. Hannis, President; J. P. Bankson, Treasurer. In December, 1863, Henry S. Hannis, having retired from the firm of John Gibson, Son & Co., became engaged in "jobbing" whiskeys, and his warehouse and office were located at No. 220 South Front street. Here he pursued his calling with increasing success each year until, from being a mere vendor, he became a producer. In March, 1867, he commenced the erection of the Hannisville Distillery, at Mordensburgh, in West Virginia, which, on its completion, immediately went into operation. Its capacity is 2400 gallons daily. The article distilled is of the highest grade of pure rye whiskey, the grain being raised and purchased in southern Pennsylvania and surrounding districts. Contemporaneously with this enterprise he effected the control, by the year, of the products of the celebrated "Mount Vernon Distillery," in Baltimore. This establishment is of the same character and capacity as the one first alluded to, and the whiskey produced is of the highest and purest grade. The success of the proprietor was now assured, and after two years control of the "Mount Vernon" brand, he purchased the entire property. This heavy expenditure required additional capital, and ultimately led to the formation of the present company, which has now a paid-up capital of $1,000,000, with an increasing surplus. It was formally incorporated May 1st, 1871. Each distillery has its separate warehouse for storage of goods, their aggregate capacity being in the neighborhood of 20,000 barrels. The company manufacture all their own casks at Mordensburgh. In 1865, Mr. Hannis, finding the storehouse in Philadelphia too contracted for his extensive business, the adjoining property, No. 218 South Front street, was purchased for him, and thereon was erected a building designed especially for its present purposes, the old premises being however still retained. The goods manufactured are disposed of to the largest houses of the seaboard cities, although a considerable quantity goes West, and the company command a large local trade, this wide demand being caused by the superior grade of whiskey manufactured, to which the company attribute their great success.

HENRY S. HANNIS, President and founder, was born in Philadelphia, February 25th, 1834. In 1850, when sixteen years of age, he entered the establishment of John Gibson, Sons & Co., where his rise was very rapid. On January 1st, 1856, he became a nominal partner in the house, continuing such until his retirement, in 1863, as above stated.

MIDVALE STEEL WORKS are located at Nicetown, Philadelphia, at the intersection of the Philadelphia and Germantown and Richmond branches of the Philadelphia & Reading Railroad. They were projected by Philip S. Justice and others, and incorporated in July, 1866, under the title of the William Butcher Steel Works, William Butcher, President and Superintendent. In January, 1870, Samuel Huston was elected President, William

Butcher retaining the superintendence. In October, 1872, the name was changed to Midvale Steel Works; in June, 1873, William Sellers became President, and in August of the same year a new organization throughout was effected, under which the works are now conducted. The first buildings erected were a steel foundry, with forty four-pot coal fires and boilers, a blacksmith shop and shear shed, mixing room, grinding room, tyre mill, moulding shop, annealing shop and an air furnace. In 1868, the present forge was built and equipped with one seven-ton double acting steam hammer, one 3000-pound, one 2000-pound, one 500-pound and one 300-pound hammer. Subsequently, a machine shop, converting furnace, gas producers, gas pot-fires, open hearth furnaces and rolling mill were added, so that the plant is now one of the largest and most complete in the country, covering eight and a half acres of land. When in full operation, this establishment employs over 350 men and has a melting capacity of sixteen tons of crucible and about the same amount of open hearth steel daily, from forty four-pot fires, five six-pot gas fires and two open hearth furnaces. Among the manufactured products are steel locomotive tyres, of which there are over 15,000 in use, open hearth forgings of any weight up to 10,000 pounds, tool machinery and spring steel in bars, crank pins, connecting rods, piston rods, guide bars, frog steel, steel axles, shear blades, crowbars, dies forged to shape, etc., etc. Tool steel is made for special purposes, as follows: for lathe tools, drills, cold sets and punches, dies, taps, milling cutters, mill picks, axes and hammers. In the autumn of 1870, a contract was signed between the Keystone Bridge Company and the Midvale Steel Works for upwards of 3000 tons of cast steel, to be used in the superstructure of the bridge over the Mississippi at St. Louis. The metal furnished was to stand an ultimate tensile strain of 90,000 pounds to the square inch, and compression equal to 40,000 pounds to the square inch, without permanent set. It was to meet the requirements of this large order that the present rolling mill was erected. The steel was delivered in the shape of staves, six of which when bound together formed a cylindrical tube, sleeve-couplings, anchor-bolts, rods, eyes, washers, rivets, pins and plates, all of which have since been used in the construction of the bridge with entirely satisfactory results. This company has also made for the Philadelphia & Reading Railroad Company, during the past year and a half, some 2000 tons of rail blooms from open hearth steel. At the Franklin Institute Exhibition of 1874, the Midvale Steel Works entered for competition samples of crucible and open hearth steel, and received an award of the highest class (silver medal) for each. Great attention is paid in these works to the selection of material and its very careful working. Although for some years after the works were started the quality of certain grades of steel was not such as it should have been, and the management was unfortunate, the success of the present management in producing in all grades steel of a superior quality would appear to promise a speedy resumption of business in all departments of these enterprising works.

WRIGHT BROTHERS & CO., Manufacturers of Umbrellas, Parasols, etc., Philadelphia. This establishment was founded in 1820, by four brothers, John, Joseph, Edmund and Samuel Wright, natives of Oxfordshire, England, who came to the United States in 1816, and at once engaged in the preparation of whalebone for umbrellas, in which business they continued until they inaugurated the present manufactory. For ten years they never exceeded 100 umbrellas per day; but have since produced, in busy seasons, as many as 4000 to 5000 in the same space of time. During their entire career, reaching over half a century, they never have suspended operations, except for a few months at the outbreak of the Rebellion, when, finding no demand for their goods, they converted their establishment into a manufactory of army clothing, and thus furnished employment to their 500 employés, who are mostly women and who would otherwise have suffered from the deprivation. They completed their contracts, amounting to about $500,000, and at once resumed their legitimate business. The establishment is located at Nos. 322, 324 and 326 Market street, with a front of 56 feet on this avenue and a depth of 206 feet; they have also about 65 feet frontage on Hudson street; the building is four stories high, and furnished with a great variety of the most approved pieces of mechanism and labor-saving machinery adapted to their class of manufactures, which are propelled by a steam engine of twenty horse power. The use of whalebone has been superseded by rattan and steel. The former article is obtained at Hamburg, from the agents of the "Dutch East India Company," and is selected from the best stock the market affords. The firm import about 250,000 pounds of rattan per annum, from which they make their selections, disposing of the imperfect canes to chair and basket-makers. They also import the silks, Scotch ginghams and other materials used in their factory, which they

purchase direct from leading houses in Europe. The yearly production of umbrellas and parasols averages 1,000,000 pieces. In 1868, Samuel Wright retired from the firm, which now consists of Edmund, John and Joseph Wright, John Noble and J. H. Filson.

CLARA FURNACE, New Castle, is the property of the Crowther Iron Company, of which firm Joshua Crowther, George B. Berger, L. Raney, Charles Greer, George Greer and C. Raney are members. These works were commenced in July, 1872, and fully completed and put in blast in August, 1873. The furnace is located on a twenty acre tract situated in the First Ward of the borough of New Castle, and is described as being of a 16 feet bosh, and 60 feet stack, having the capacity of producing 16,000 tons of metal per annum. The daily consumption averages sixty tons of Lake Superior ores, fifty tons of limestone and fifty tons of coke. There are several buildings on the premises; a frame stock house, 126 feet by 60 feet; a brick casting house, 114 feet by 52 feet; an engine house, 52 feet by 30 feet, and a boiler house, 72 feet by 40 feet. There are two hot blasts; four boilers, each 66 feet long; one vertical engine, built by McIntosh & Hemphill, with a 7 feet blast cylinder, 35 inch steam cylinder and 4 feet stroke. Since starting the works, in August, 1873, they have been in steady operation—with the exception of six weeks—and, although not pushed to their full capacity, have manufactured 14,000 tons of metal, of which 6000 are on hand. Although not among the largest, it is one of the most successful and complete in all its appointments of any in the State. The company enjoys the best of manufacturing and shipping facilities, not excelled by any in this section.

JOSHUA CROWTHER, from whom the company owning the Clara Furnace derives its name, is the eldest son of the late John Crowther, and was born in Wolverhampton, Staffordshire, England, February 29th, 1820. His father, who had been engaged in the iron business in England for many years, came to the United States in 1841, and erected two blast furnaces for the Great Western Iron Works, at Brady's Bend, Pennsylvania, of which he was manager for two years, and then went to Ohio, where he built the Lowell Furnace, being the first ever constructed in this country for especially using the raw bituminous coal; and, at the same time, he managed the Briar Hill Furnaces, in Youngstown, Ohio, owned by James Wood, of Pittsburgh. After remaining here two years, he retired from the same, and eventually returned to England, in 1851, to attend the "World's Fair," and resided there until his death, in 1862. Joshua Crowther was brought up to the iron business, as indeed were all his brothers, of whom but two are now living (Benjamin Crowther, a partner and Manager of the Isabella Furnace, and Joseph J. Crowther, Manager of the Superior Furnaces, Pittsburgh). He came to this country in 1840. His first charge was to become manager of two charcoal furnaces in Morgantown, West Virginia, where he remained two years. These works, under an old and experienced furnace-man, had yielded nine tons per week. He immediately repaired the works, and soon increased the yield to twenty-one tons in the same space of time. This great increase caused much excitement in that section of country and redounded to his reputation as an able and efficient furnace-manager, which has ever since been on the increase. After this engagement he became Assistant-Manager of the Great Western Iron Works, under his father, at Brady's Bend, where he also remained two years, relinquishing that position to become Manager of the Old Middlesex Furnace, then owned by Sennett & Warren, which he changed from a charcoal to an anthracite furnace. After a year's sojourn, he removed to Greenville, Pennsylvania, where he constructed a furnace for King & Smith, and operated the same for eighteen months. He next became Manager of the Reed Furnace, at Sandy Lake, for one year, and thence repaired to Spring Mills, Montgomery county, Pennsylvania, where he managed the anthracite furnace of J. Cooney for eighteen months. It was here, in 1849, that he applied pipes to the furnaces, conducting the gas to the boilers—being the first attempt of the kind in the history of the iron business. He next proceeded to Lowell, Ohio, where he introduced the same improvement with the greatest success. His engagement there lasted one year, and thence he went to New Castle, Pennsylvania, and superintended the building of the Sophia Furnace, of which he was manager for six years thereafter. His next move was to the city of Pittsburgh, where he designed and erected, for Graff, Bennett & Co., the first iron blast furnace stack ever constructed in the United States—the Clinton Furnace. For some months he managed the same, and then took charge of the Shenango Furnaces, in Middlesex, owned by G. W. Tifft, of Buffalo, New York, where he remained eighteen months. He returned thence to New Castle, where he rented and operated the Croton Glass Works for a year. In 1864, he designed

Joshua Crowther.

and erected the Superior Furnace, in Pittsburgh, for Bennett, Ritche & Co. These are twin coke furnaces of 13 feet bosh and 45 feet high. In 1866, he took charge of the Shenango Furnaces of Reis, Brown & Berger, in New Castle, and, in 1868, built the Etna twin furnaces, in the same town, of which company he was a partner. In 1870, he went abroad, and visited the principal iron works in England, Scotland, and Wales, gaining much valuable information, which he afterwards turned to account. After his return to the United States, in 1871, he designed and executed the drawings for the celebrated Isabella Furnace, near Pittsburgh, of which his brother Benjamin is part owner and manager. In the following year he built one on the same plan for Reis, Brown & Berger, New Castle; and in 1872–'73, he erected the Clara Furnace hereinabove described, of which he is part owner and manager. From this summary of his work for the past thirty-three years, it will be seen that he has very much advanced the art of furnace building, having introduced several valuable fuel and labor-saving improvements, and has gained a wide celebrity for having furnished designs and drawings for a large number of furnaces throughout several States. In his long, varied, and unusually active career, he has witnessed many changes in furnace management, and a very marked progress. His maiden charge in this country, as above narrated, won for him much eclat, in more than doubling the weekly product; but what was then considered a prodigy—twenty-one tons per week—has fallen into utter insignificance, for he has lived to construct a furnace producing 600 tons during the same space of time. He has rare genius in this direction, and there are but few who can assert that they have been so long and uniformly successful in the business. Although past the meridian of life, he bears his years lightly, and has the promise of a long career of usefulness yet before him. He has acquired a handsome competence.

GROCERS' STEAM SUGAR REFINERY, Henry W. Bartol, Proprietor. This establishment was started, in 1859, by B. H. Bartol and Alfred Kusenberg, the former furnishing the capital, in the buildings still occupied for that purpose, on Passyunk avenue, immediately to the north of the "Bishop's Ground." The buildings cover the greater part of the lot of 80 feet front on the avenue, with a depth of 400 feet, and are six stories in height. The business followed is more strictly speaking the manufacture of sugar from molasses, which is boiled, and then subjected to the centrifugal process. When the establishment first went into operation, the daily consumption of molasses was about twenty-one hogsheads. In 1864, Alfred Kusenberg retired, and the business was continued by B. H. Bartol, father of the present proprietor, under whose management, as well as of his son, the operations have steadily increased, until at the present date eighty hogsheads of molasses are boiled daily. This establishment is notable as being the first in the United States to manufacture sugar by this process, which is the mode universally adopted at the present day. It was also the first house to make washed or high-grade sugars from molasses, which article, under the brand of "Extra C Yellow," acquired a wide reputation in the United States. In 1871, B. H. Bartol retired from the concern, leaving his son, Henry W. Bartol, as owner and proprietor. The amount of capital at present invested in the business is about $400,000, and the number of hands employed is between thirty and forty. The value of the sugars produced averages about $1,000,000 annually. The great success which has attended the sugar house is due to the close application which has been given to all the minutiæ of the business, and in making the highest grades of sugars from molasses and syrup, and having the goods standard, so that a sample shown in February may be equally satisfactory to one who makes a purchase in October. In this connection it may be remarked that the present proprietor effected a complete revolution in the manner of fixing the value of molasses, by causing the "polarization" to be accepted as its standard of value; the polarizer giving the amount of cane or crystallizable sugar that the molasses contains. He brought with him from Europe, in 1867, three of these instruments, which, while not the first in the country, were the first that were used to any extent, and it was only after the lapse of years that he succeeded in overthrowing the old system of valuation. In January, 1872, he established, at No. 109 South Front street, an office for the purchase of the raw material, and the sale of the products of the refinery, previously attended to by a commission merchant; this he still continues to maintain at the same locality.

HENRY WELCHMAN BARTOL was born in the city of New York, January 15th, 1847. During his infancy his parents removed to Philadelphia, in which city he was principally educated, closing his studies at the Polytechnic College. When fifteen years old he joined the Second Keystone Battery,

which, however, did not advance much beyond Harrisburg, seeing no actual service other than guarding prisoners. On his return from the army, his father having determined that he should ultimately succeed him in his business of sugar making and refining, and with a view of having him thoroughly conversant with machinery, placed him in Merrick & Sons' machine shop as an apprentice. While there employed, he devised an improvement in sugar machinery, which he patented. Owing to the sickness of the superintendent of his father's refinery, he left Merrick's sooner than he intended, and took temporary charge of the sugar house, which he retained until the superintendent recovered. He remained, however, at the refinery, learning the business thoroughly and completely. In the fall of 1866, having thus attained an insight into the various processes, and having amassed quite a sum, accruing from the royalties on his patent, he sailed for Europe. After a hurried trip through the Continent, meanwhile examining the process of making sugar from beets, he settled down in Paris, where he remained some four months, studying the analysis of sugars, and the chemistry pertaining to sugar refinery, under Dubrunfaut and Emile Monier, two eminent French chemists. He returned to Philadelphia in the summer of 1867, and, in the autumn of that year, took the entire charge of the refinery, his father desiring to visit Europe. Having been much interested in the manufacture of beet sugar, while abroad, he endeavored to create a like interest in that industry in this country. He wrote a number of articles on the subject, and translated others, which he published; besides voluntarily making a large number of analyses of beets from all parts of the country. On the return of his father, in 1868, he desired to further perfect himself in the particular branch of chemistry which had already engaged his attention, and for this purpose again sailed for Paris, where he remained about six weeks. On his return home, in the summer of 1868, he again assumed charge of the refinery, and was given an interest in the business. In the spring of 1869, his attention was directed to the remarkable saccharine properties of North Carolina sweet potatoes, and he analyzed some specimens, and found them to contain a large percentage of sugar. He made a quantity of sugar from these potatoes, which he exhibited to the Franklin Institute, in connection with some starch extracted from the same source, and read a paper on the subject before that body. This being the first sugar made from sweet potatoes, attracted considerable attention, and he received favorable notices for the same from several learned societies in this country and Europe, and also from various scientific journals. In January, 1871, he was elected a manager of the Franklin Institute, and at the expiration of his term, in 1874, was re-elected to the same position.

SPENCER, McKAY & CO.'S BREWERY, Pittsburgh. This establishment was originally started by Adam Woods, in 1843, at the corner of Second avenue and Brewery street, Pittsburgh, and was then known as "Woods' Steam Brewery." It was at first of but small capacity, producing about 3000 barrels of ale each year. In 1845, it was destroyed by fire, but its proprietor erected another building, at the corner of Liberty and Seventeenth streets, and gave it the same name. Its capacity increased to 6000 barrels per annum, and the business was carried on until 1857, when the property was sold to St. Patrick's Roman Catholic Church. The brewery was removed to the corner of Twenty-fourth and Smallman streets, occupying a building 56 by 154 feet, and producing 8000 barrels in the year. In 1859, the senior partner of the present house purchased the property, and, November 23d, 1859, established the firm of Spencer & Garrard, and continued the business until 1862, increasing the yield to 9500 barrels per annum. In September of the last-named year this firm was dissolved, and the present firm constituted. From this date to July, 1865, the business increased greatly, averaging 20,000 barrels per annum. In June of this year they lost the entire establishment by fire; but they immediately proceeded to rebuild the brewery, which was furnished throughout with the most complete and approved machinery, and were ready, in October, 1865, to recommence their business. Since that period, they have been the leading ale brewers in the city, and in the season of 1873–'74, manufactured 60,000 barrels of ale, or nearly double that of any other brewery in the city. The main building measures 154 by 150 feet, and is six stories in height. It is located at the corner of Smallman and Twenty-fourth streets. The barley is delivered in the grain-receiving room, where it is first weighed and then elevated to the malt loft, which is on the highest floor of the building. The malt room measures 154 by 62 feet, and will hold 20,000 bushels. The kilns for drying the malt are 30 feet square, with perforated iron floors, and from the lowermost one to that nearest the top are heated by steam flues, one being placed in each corner; at the highest one the ceiling verges to a point, where the heat eventually makes its escape

through a ventilator in the roof. After the malt has remained in the "mash" tub a sufficient length of time it is passed to the boilers, where it is effectually cooked by steam. It now passes to the fermenting cellar, which measures 62 by 70 feet, containing eight fermenting tubs, each of the capacity of 350 barrels. In this cellar there is a well of pure cold water about 60 feet deep, from which the water is drawn by two steam force pumps, and conducted through pipes placed within the tubs to cool the liquor, which in process of fermentation generates heat. By the water being of a remarkably low temperature, the firm effects a saving of at least $10,000 per annum, which would otherwise be expended for ice. There are about eight brewings per week, and the average of each brewing is about 200 barrels. When the last vestige of effervescence has subsided, the liquor is again boiled, and the hops added. At the proper time the ebullition is diminished and finally ceases; the liquor is cooled and drawn off into barrels, and stored in the Fresh Ale Vault, which covers a space of 62 by 120 feet, and can contain about 6000 barrels. Below this is the Stock Ale Vault No. 1, measuring 24 by 120 feet. It is about 30 feet below the surface of the ground. The temperature during the summer months is about 25 degrees, while in the winter season the mercury stands but a few degrees above zero. The Stock Ale Vault No. 2 is of the same dimensions, and can contain 2150 barrels, while No. 1, being considerably higher, will store some 5000 barrels. The cooperage gives constant employment to twelve hands, who turn out three dozen barrels each day. The stave yard is 120 by 144 feet, and contains in stock 500,000 white oak staves, valued at $40 per thousand. In this yard they remain two years before they are sufficiently seasoned to be used by the coopers. Great attention is likewise paid to the cleansing of the barrels, so that they shall be perfectly clean and sweet; after which they are tested to discover any leak in the wood. The motive power for the various machinery, etc., is furnished by a horizontal engine of 10 inch cylinder and 3 feet stroke. The boiler is a double flue, 42 inches head and 32 feet in length. To enable this house to transport their stock, they own thirty-six of the finest draft horses in the city, beside four mammoth mules. The capacity for shipping is enormous. In the spring of 1871, the firm shipped, from 7 A. M. to 9 P. M. of one single day, 1400 barrels of ale from their brewery to the foot of Wood street, a distance of over two miles.

JOSEPH SPENCER was born, January, 1814, in Derbyshire, England, of humble parentage. He received but very little education, and at an early age commenced to labor for his support. He learned the trade of making horseshoe nails, and for some years followed this business in his native district. He emigrated to the United States in November, 1841, and settled in Pittsburgh, where he followed his trade until May, 1848, when he became the proprietor of the Bull's Head Hotel, which he carried on for upwards of twenty-one years. In July, 1869, he retired to a country seat—a very fine fruit farm of fourteen acres—at Home Wood Station, on the line of the Pennsylvania Railroad, which he had purchased. Here he is enjoying the wealth he has accumulated since his arrival in America, which he estimates at $500,000.

ROBERT LIDDELL (one of the partners) was born in Houghton, Le Spring, Durham county, England, in 1837. There being no free schools, he received his education in a private school. At the age of thirteen he entered a dry goods store in New Battle village, where he remained two years. In 1852, he emigrated to the United States, and went direct to Pittsburgh. He found employment in the store of William H. Brown (the "coal king") at Brown's Station, of which he took charge, and where he remained some fifteen months. After leaving the store he engaged in the coal business, associating himself with George Gray of Saw Mill Run, and John Kennedy of Cookstown. In this business he remained until 1862, when the partnership was dissolved, and he went into the brewery.

FAUNCE'S STONE QUARRY, Samuel P. Faunce, Proprietor, is located on Adam street, between Pine and Leiper streets, in the Twenty-third Ward of Philadelphia. It was opened, in 1849, by the father of the present owner, who operated it for five years, and was then succeeded by his son, who has since continued the business. Forty-five hands are steadily employed, and the amount of blasting powder annually consumed is estimated at $3500. About 35,000 tons of rock is the average yearly yield, representing in value about $70,000. The stone is a blue granite of a superior quality, and is extensively used for paving and building purposes. Among other structures in which it has been used may be named the "Siloam" Church and the Twenty-third Ward public school building on Oxford below Cherry street. It is the best quality of the ashlar that is used for these purposes. Beside this, the quarry also yields a very superior building stone which is much sought after.

SAMUEL P. FAUNCE was born in Frankford, Philadelphia, in 1834, where he received an ordinary common school education. His first step after leaving school was to labor in his father's quarry, where he continued until he eventually succeeded to the business. He has been frequently solicited by fellow-citizens who desired to place him in nomination for Select Council on several occasions, but has always declined the honor, preferring the steady and successful prosecution of his business, believing that his true sphere of duty lies in this direction.

SHERIDAN FURNACES, William M. Kaufman & Co., Sheridan, Lebanon county. This establishment commenced operations in September, 1862, the first furnace being erected at that time by the senior member of the firm, to which a second was added in 1874. The furnaces are of the ordinary "anthracite" description, and manufacture a superior quality of pig-iron for stove castings and forge purposes. Their capacity is about 16,000 tons per annum. The firm are the owners of valuable beds of iron ore, which they mine themselves, and transport on their own cars from the mines to the furnaces, having every convenience on the premises for dumping cars on the several sidings.

WILLIAM M. KAUFMAN was born July 24th, 1834, in Berks county, Pennsylvania. After leaving school at the age of fifteen, he became a clerk in a dry goods store at Leesport, where he remained three years, and then obtained a position as clerk at Moselem and Leesport Furnaces, where he continued for four years. When twenty-two years old he engaged in the iron business, on his own account, at the Mount Penn Furnace, in Berks county, which he conducted for six years; and early in 1863, he removed to Sheridan, where he still resides. For seven years he was a Director of the Farmers' Bank of Reading, and was one of the corporators of the Jamestown Bank in Lebanon county, when it organized, in October, 1873, and is a member of its Board of Directors. Though no politician, he was nominated and elected as a member of the State Legislature in 1872, and re-elected in 1873. He served, during both sessions, as a member of the Committee on Ways and Means, and also on other important committees, and was Chairman of that on Coal and Iron. He was also chosen Senatorial Delegate to the State Convention of 1872, which nominated General Hartranft as Governor.

BAKER, ARNOLD & CO., Manufacturers of Chandeliers and Gas Fixtures, Philadelphia. The senior partner, William C. Baker, was the successor of his father in the old firm of Cornelius & Baker; while Crawford Arnold occupied for a number of years a position of trust and experience with the same. This house dates from the year 1800. In 1870, the firm of Cornelius & Baker dissolved, and two co-partnerships was the result, one of which is the present house of Baker, Arnold & Co. They purchased a large piece of ground, fronting on Twelfth street, and bounded by Brown and Olive streets, on which they erected a large brick building in the form of a hollow square, five stories high, and as nearly fire-proof as possible, beside having all the known precautions ready for use in case a catastrophe should happen, including a reservoir of water—7000 gallons—on the top of the building, to be used in case of emergency. The most perfect system of carefulness prevails, and the watchmen are enjoined to make and record hourly observations as to the amount of steam pressure and water in the boilers. Telegraphic wires connect the factory with the salesroom on Chestnut street, with the residence of the senior partner, and with the Western Union Telegraph Company. Adjoining the factory are two dwelling-houses, erected by the firm, one of which is occupied by the engineer in charge, and the other by one of the foremen, so that in case of accident one or both of these may be accessible during the hours of rest. Many processes must, of necessity, be carried on within the factory; for many artisans are required to erect a large chandelier. In the studio the first step is taken to design the article to be produced; and here are collected drawings and copies of all of the most celebrated masterpieces, whether in marble, painting, interior decoration, or architecture; so that any particular style can be learned from the choicest specimens extant, and then converted into the every-day use of the gas fixture or the more ornate chandelier. After the crayon design comes the modelling in plaster and wax, which sometimes requires days to complete. From this mould the brass duplicate is eventually produced, which, after being subjected to the "chaser"—who deepens the impressions of the surface, and upon whose skill much of the successful completion of the work depends—is returned to the casting room, and reproduced as desired. Various processes, such as filing, brazing, re-filing, dipping or cleansing, gilding or silvering and burnishing, are each in their turn passed, and the fixture is laid aside for testing. Many descriptions of gas fixtures are made of

bronze metal, and after casting the pieces undergo the same earlier treatment as their companion brass pieces, until they arrive at the stage of coloring. They are now lacquered, and when this coating is carefully prepared and skilfully applied will preserve its rich color many years, unaffected by the vicissitudes of atmosphere. In the finishing department all the pieces are fitted together and subjected to powerful atmospheric pressure, to render it certain that no hidden vent occurs, which would entail a leakage of gas. This test proves effectual in almost every instance, so carefully has the workmanship been done. The different articles are now ready for the salesroom, or for shipment, which latter embraces every part of the United States, Cuba, South America, Mexico, China and India. Among the numerous public buildings supplied from this manufactory may be mentioned the entire, elegant, chaste and unique fittings of the new Masonic Temple, Philadelphia; also in the same city the Philadelphia Annuity and Trust Company, and the Provident Life Insurance Company; the opera houses at Easton, Reading and Erie, Pennsylvania; the Capitol buildings at Trenton, New Jersey, and Jefferson, Missouri; the Corcoran Art Gallery at Washington, District of Columbia; the banking house of Drexel & Co., New York city, and the Leiderkranz Hall at Louisville, Kentucky. All the machines used in the details of the operations already described are the inventions of those connected with the establishment, and the proprietors are constantly on the alert to avail themselves of every improvement. Three large boilers on the premises supply the motive power for the various wants of the manufactory, in which there are employed from 400 to 500 hands. The large financial resources of the house—the firm owning all the buildings, paying cash for all materials and the operatives in full every week—enable them to purchase and manufacture in large quantities and at the lowest rates.

GEORGE JACOB FALLER, Manufacturer of Sewing Machine Oil, Philadelphia.—This establishment, situated at No. 846 North Third street, was founded by the present proprietor in July, 1864, on the site it now occupies, with a frontage of 22 feet and a depth of 215 feet. Since its foundation it has twice been rebuilt; each time on a larger scale. Some five years previous to starting this factory, Mr. Faller, whose employer used to deal largely in oils, was impressed with the great difficulty which existed in getting an oil suitable for sewing machines; all those then in use either clogging the machine or destroying it by their acid properties; and so was led to make a series of experiments, which resulted in the manufacture of the article in its now perfect state. The produce during the first year averaged only a gross and a-half of bottles per week, but has since been steadily increasing, and now is estimated at fifty gross per week; at a cursory glance, not a very large amount; but when the delicate nature of the sewing machine is considered, and the very small quantity which each machine requires, this amount of produce may well be regarded as considerable. The oil is used throughout every State in the Union, and is exported to the West Indies and Canada. The quality has never been allowed to deteriorate; and it is to the fact of having thus always kept up the standard that Mr. Faller attributes his success. This is the only sewing machine oil which received a premium at the Franklin Institute Exhibition of 1874.

GEORGE JACOB FALLER is a native of Wurtemberg, Germany, and was born February 19th, 1839. He came to this country at the age of eleven, and soon after landing was employed in the very old established store of Rugan Neff, northwest corner of Eighth and Vine streets, where he continued eight years. He then served for a short time in the wholesale store of Tenbrock Brothers, 3 and 5 South Water street, and on leaving them he embarked in his present enterprise, though much against the advice of his friends, who deemed it impossible that a livelihood could be made by the manufacture of an article in such apparently small demand. The result has more than vindicated Mr. Faller's judgment. He married in 1864. His wife is still living, and they have one child.

UNION SALT COMPANY, Pittsburgh and Allegheny City, Haller, Beck & Co., Proprietors. The property of this company consists of two works; the oldest, located in the Thirty-fourth Ward of Pittsburgh, came into the hands of S. B. Ross in 1852, the salt-well having been developed as early as 1826. Mr. Ross, at the first-mentioned date, became the sole manager and proprietor of these works, and continued to operate them until 1865, when he associated with him August Haller and John B. Beck, who were practical and energetic men; and these three composed the Union Salt

Company. Mr. Ross subsequently retired from the active management of the works, and left to Haller & Beck the prosecution of the business he had so successfully carried on for years. The gentlemen who now composed the company determined to extend their business, and having purchased a tract of ground in Allegheny City, at the corner of Western and Beaver avenues, sank a well, which proved to be a good flowing one, and erected the works which now stand in Allegheny City. These latter are more extensive than those in Pittsburgh, but both are constantly operated by the company. The old well in Pittsburgh has been deepened from time to time, under the able management of this company, until it has reached a sink of 1300 feet, which is the same depth as that of the Allegheny well. The process of manufacturing salt, although a simple one, is so regulated by this company that all the material necessary in its production is completely utilized; and the arrangements of the works are such that no unnecessary labor or expense is incurred in the different processes through which the water passes previous to its conversion into salt. The water from the well is first conveyed to a large reservoir, having a capacity of 40,000 gallons; this is located outside of, but contiguous to, the boiler and furnace buildings. On leaving this reservoir, it passes over and into large tanks, which adjoin the furnaces, and is here submitted to a boiling process. This being effected, it is conveyed by means of pipes into another building, where it passes through the settling and evaporating processes. In this building are located seven tanks, each of the same dimensions—150 feet long, 9 feet wide and 2 feet deep. Running through these tanks are three lines of pipe, from which is derived the heat that produces the evaporation and crystallization of the water. The steam, which passes through these lines of pipe, is that which arises from the water as it is undergoing the boiling process. This steam is conducted from the boiler room through a set of pipes, and received into a large wooden tank in the evaporating building, from which it is distributed into the various settlers and evaporators. The water, as it comes from the boilers, is first received into the settlers, three in number, where it becomes clearer and clearer as it leaves each one consecutively. After passing through the last settler, it enters the evaporators, where the crystallization takes place, as the water in them receives a greater degree of heat; the change occurs as it passes along. As the crystals receive body, they are precipitated to the bottom of the tank, and the salt is thus formed. After being dug from the tanks, the mass is thrown upon a large platform adjoining them, and allowed to remain until all the superabundant moisture has dripped away: it is next removed to the store and packing room, which is a building 120 feet square. The produce of this company is said to be more extensive than that of any other salt company in the State. Over 10,000 tons of salt are turned out annually, and their trade extends through a circuit of several hundred miles. They employ about fifty hands in the two works. In connection with the salt manufactories is a large coopering establishment, where they make many of the barrels, etc., used in shipping the salt. The varieties of the salt, as made by this company, are classified as follows: Table, Dairy, Extra No. 1, No. 1 and Coarse Crystal, the last named being used extensively by the glass manufacturers. As to the superior quality of their products, the extensive trade they control speaks for itself; and the thorough system which characterizes their works has necessarily made the Union Salt Company a success.

AUGUST HALLER is a native of Alsace, but came to the United States when quite young. Previous to his connection with the Union Salt Company, he had been successfully and extensively engaged in sinking oil wells. His talents are now exclusively directed to the general management of the works; and the perfect system maintained therein testifies to his fitness and ability for the position.

JOHN B. BECK was born in Bavaria, and, like his partner in business, was, antecedent to becoming a member of the firm, actively and successfully employed in sinking oil wells. As a member of the firm, he attends entirely to the sales department and collections, and is eminently qualified for the position he fills.

LOCKWOOD MANUFACTURING COMPANY, located at Nos. 255, 257 and 259 South Third and 10, 11 and 12 Levant streets, Philadelphia, is the pioneer establishment in the United States for the successful fabrication of paper collars. In 1854, Walter Hunt received his patent for this invention, which he disposed of to two parties. One of these parties, E. H. Valentine & Co., of New York, commenced the manufacture of the article, but not meeting with success disposed of his interests, and in 1858 William E. Lockwood, of

Philadelphia, purchased the same with the machinery and inaugurated the enterprise in the Keystone Mills, near Fairmount Water Works. By a judicious system of advertising he succeeded finally in convincing the public—who were generally prejudiced against their use—of the perfect adaptability of paper as an article which might be worn, of their rivalling the best laundry dressed linen collars in whiteness and gloss, besides being sold cheaper than the original linen collar could be properly washed and ironed. During the year 1859, one million and a-half collars were sold, and nearly two and three-quarter millions in 1860, increasing to four millions in 1861 and eight millions in 1862. In 1860, finding his quarters at the Keystone Mills too limited in extent, he removed to the spacious buildings above named, where his manufactory is still carried on under the title of the Lockwood Manufacturing Company. The buildings have fronts on Third and Levant streets of 47 feet each, a depth of 187 feet, with a height of five stories. In the different apartments there are about ninety machines used in the various processes, to which power is communicated by means of over 600 feet of shafting from a forty horse power engine located in the basement. The exhaust steam is utilized not only in warming the building, but in boiling water and heating glue and paste. Many of the machines are novel, and some exceedingly costly; one of these may be cited: that for properly combining the paper and muslin (cloth-lined collars), so as to overcome the unequal expansion and contraction of the two substances, and upon which nearly $30,000 has been expended. The finishing or polishing is effected by the combined sheet being passed between two highly chilled rolls. The collars are cut into shape by means of a registering cutting machine, having a capacity of cutting 240,000 collars each day, and requiring the attention of but two operatives. The stamping of the patent, the size and the imitation stitching, is effected at one operation by steel dies; they are next passed to the punching machine, which forms the button-hole, and afterwards to the folding machine, partly invented by W. E. Lockwood. Collars of paper only, with cloth-lined button-holes, are likewise manufactured in endless variety; also paper cuffs for ladies' and gentlemen's wear. In 1862, the proprietor purchased the entire interest in the original patent, which was subsequently reissued in four divisions, including both collars made of white paper imitating starched linen and collars composed of paper and muslin, or an equivalent fabric. In 1863, he associated his brother, E. Dunbar Lockwood, with him, and the firm became W. E. & E. D. Lockwood. In 1863, after five years of persistent contest against prejudice, paper collars became a success. Then commenced a new era in the history of paper collars. Success, no matter in what direction achieved, has attached to it a penalty. The patents which Mr. Lockwood had acquired, and to which he had the right to look for some protection, were largely pirated by unscrupulous men. Collar factories sprang up in various parts of the United States, and a new battle had to be fought. Recourse was had to litigation to establish patented rights, and this continued until 1866. When a proper understanding of the equity of Mr. Lockwood's patented claims was reached by the better class of collar makers, they were desirous of continuing their business under license of said patents. To harmonize conflicting interests, negotiations were entered into which resulted in the formation of the Union Paper Collar Company, and a majority of collar makers took license therefrom. In this negotiation all the original patent rights on paper and cloth and paper collars held by Mr. Lockwood passed to the Union Paper Collar Company, which at once brought suits and still has several pending in the courts of the United States. This litigation so far has cost the plaintiffs over $200,000; what the expenses of the defendants aggregate can only be approximated. Having associated his brother, under the firm of W. E. & E. D. Lockwood, and being relieved of the litigation part of the collar business by the sale to the Union Paper Collar Company, they at once added facilities to their machine shop, and, having acquired valuable patent rights on envelopes and envelope machinery, began the building of envelope machines. Something more than a year was spent in their construction. This machinery was at once started, and makes what is known as "Lockwood's Improved Envelope," cut from a continuous roll of paper at four times the speed of any other envelope machine, and with a corresponding saving in waste material. This machine cuts, pastes, folds and gums from 140 to 200 envelopes a minute. In addition to this patented form, they run one department on the old form, having purchased the entire machinery in use in the United States Treasury Department. They have also a large department devoted to what are known as hand-made envelopes, *i. e.*, envelopes so large or of such irregular sizes as to be in such a moderate demand that they do not warrant the construction of machinery for their manufacture. In connection with the collar manufactory there are apartments appropriated to the making of paper boxes, of which

over a million per annum are produced. The printing of labels, cards, etc., is all done on the premises, by means of ten printing presses, and 900 founts of type. A large apartment on the second floor is appropriated to the manufacture of patent direction labels or "tags." The large amount of paper cuttings necessarily produced in the cutting department, over 5000 pounds per week, is here utilized and converted into tags, under a special patent. The sales of these alone amount to $25,000 per annum. The establishment gives employment to nearly 300 hands, a greater portion of whom are women. It is estimated that the sales in the entire country are $4,000,000.

ALGODON MILLS, Barton & Cotton, Proprietors, Chester, have been in successful operation for several years. On January 1st, 1866, James Barton, Jr., and Simeon Cotton associated themselves together, constituting the above-named firm, and commenced the erection of the mill, which comprises a three story main building 100 feet long and 50 feet wide · a two story addition, 66 by 30 feet ; and also all the necessary outbuildings to successfully prosecute the business. There are about five thousand spindles, ninety looms constantly running, together with the usual quota of side machinery. The motive power is furnished by a Corliss engine of eighty horse power, driven by three Dimpfel boilers. The firm employ about seventy hands ; and consume daily 1200 pounds of cotton, from which about 1000 pounds of yarn are produced, which is used in the manufacture of tickings, stripes, and denims ; the aggregate of which is estimated at 1,000,000 yards per annum.

CAPTAIN JAMES BARTON, Jr., was born in Delaware county, Pennsylvania, October 28th, 1836, and is the son of James Barton. He is of Irish descent ; the founder of this branch of the family having come to America in the early part of the eighteenth century, and settled at Chester, in and around which their descendants have since continued to reside. Having received a good education, he entered upon the scientific course with the Freshman class of Dickinson College, in 1852 ; but, being interrupted in his studies, he was engaged in teaching for some time previous to his re-entering the Sophomore class in the same institution, from which he graduated in 1861. He entered the army, in Company A, 7th Pennsylvania Reserves, and served until he was discharged, in May, 1862. On his return home, he raised a company, recruited for nine months, and at the close of July, these became a part of the 124th Pennsylvania Regiment ; of this company he was Captain. He afterwards had a similar command in the 196th Regiment, "one hundred days' men." At the close of the war, he entered upon the study of the law, with Hon. John M. Burnside, but never engaged in practice, circumstances leading him to embark in his present enterprise. He is an active member of the City Councils, and a promoter of every scheme for public improvement that commends itself to his judgment.

SIMEON COTTON was born in Staffordshire, England, October 16th, 1821, whence his parents removed to Stockport, in Cheshire, about 1824. Here he received a limited education, and when but eleven years of age, entered a cotton mill at the last-named locality. He came to the United States in 1842, and settled at Rockdale, Delaware county. From 1845 to January, 1847, he worked for J. P. Crozer, at Crozerville. Thence he repaired to Knowlton, where he was engaged with Lownes & Blakely, afterwards Lownes & Lewis, continuing in their employ for nineteen years, being foreman for the period of nine years, and until he formed the present co-partnership. He has filled the office of School Director from 1869 to 1874.

DAVID RITTENHOUSE PORTER, Manufacturer, and Governor of Pennsylvania, was born October 31st, 1788, in Montgomery county, Pennsylvania. General Andrew Porter, his father, was a distinguished soldier of the Revolution, and subsequently the first Surveyor General of the Commonwealth, a branch of science in which he had been the pupil of the eminent David Rittenhouse, after whom he named this son, whom he early destined for the bar. The confinement of legal studies, however, undermined his health, and consequently he chose the more active pursuit of an iron manufacturer, and for that purpose removed to Huntingdon county. Here he gave close attention to the most improved methods of reducing and refining ore. In 1821, he was elected a member of the House of Representatives of the State, and subsequently of the State Senate. His speeches in these bodies, always brief but full of point, of practical wisdom, and sound information, soon attracted the general attention of the community. In 1838, he was elected Governor of the

State, an honor he wore with such general satisfaction that again, in 1841, he was called to the chair, and this time with a majority nearly four times as large as at his first election. His insight of men and measures has rarely been surpassed. His appointments of Judges (then not elected as now), without exception, gave entire satisfaction; while his appreciation of the great industrial discoveries of that day surpassed that of nearly all his contemporaries. In one of his early messages, he predicted that men then living would see a continuous line of railroad from Philadelphia to St. Louis, a prediction ridiculed at the time as chimerical in the highest degree. To his financial integrity and sense of justice in reference to the State debt, Pennsylvania owes much of her present high character in the European money markets; and his personal courage and decision were so fully attested at the period of the Philadelphia riots (1844), that both branches of City Councils publicly thanked him. After the completion of his term, he resumed, in 1845, the manufacture of iron, directing at Harrisburg the first anthracite furnace built in that portion of the State. His success was commensurate with the enlightened intelligence he devoted to this leading branch of industry; but in the severe financial reverses of 1857, he shared heavily in the misfortunes which prostrated all industrial pursuits. They were borne, however, with a dignity and fortitude which corresponded to his firmness of character, and though well advanced in years, he did not yield to discouragement. The war of the Rebellion interested his sympathies strongly on the side of the Union, and he rejoiced that one of his sons, General Horace Porter, had been able to take part in so many of its conflicts. He lived to witness the success of the Union cause, though in declining health. He died on the 6th of August, 1867.

ASHLAND PAPER MILLS, Montgomery county, S. A. Rudolph & Son, Proprietors. These mills were founded, in 1864, by J. D. Heft & Co., the firm consisting of J. D. Heft, John W. Dixon, and S. A. Rudolph. The entire works were constructed by them, and are situated at Belmont avenue and Schuylkill road, in the village of West Manayunk, Township of Lower Merion. When they first went into operation, the firm manufactured straw boards; but in the latter part of 1864, they erected machinery and the necessary buildings for the manufacture of white paper from wood and straw, under the process known as the "Dixon Patent." On April 21st, 1867, the main building of the mill was destroyed by fire. At this time John W. Dixon withdrew from the firm, and the remaining partners rebuilt the structure. In January, 1868, J. D. Heft disposed of his interests in the business to S. A. Rudolph, who has continued the same to date. In January, 1875, the latter admitted his son, Augustus, into the business which constitutes the present firm of S. A. Rudolph & Son. The area of ground embraced in the establishment is about eleven acres, including the reservoir for storage of water. There are six steam boilers, aggregating 250 horse power, and three steam engines on the premises furnish the motive power for driving the various machines. One of these is of the Corliss pattern with a 20 inch cylinder, built by Miller & Allan of Chester; another of 16 inch cylinder, built by Robert Wetherill & Co., and a third of still smaller dimensions, a horizontal engine. There are seven paper engines; three of these carry 1000 pounds each, two others of 500 pounds each, and two others of 350 pounds each. There are on the premises two wet machines or pulp dressers of 84 inches each; one 74 inch Fourdrinier machine, and one 66 inch Fourdrinier. In addition, may be found the usual amount of side machinery necessary to complete a well-furnished paper mill. There are also three of the "Dixon Patent Straw and Wood Digesters," measuring 20 feet long and 6 feet in diameter. This process is believed to be the best now known for the production of white paper from wood and straw; but all improvements which from time to time arise, in the manufacture of paper, are recognized and adopted. The paper as manufactured is of the best quality, second to none in the market, and meets with a ready sale in Philadelphia, New York, and San Francisco. About 2,500,000 pounds are annually produced. The firm employ eighty-six hands, for whom they have erected tenant houses on the lands for their accommodation. The success which has marked their business career is due to the fact, that they pay strict attention to the same, and aim at furnishing a good article, as they employ nothing but the best material attainable.

SEBASTIAN A. RUDOLPH was born in Echenheim, Grand Duchy of Baden, Germany, January 15th, 1829, and came to America with his father in the fall of 1836. After landing in New York, his father proceeded to Manayunk, and on the second day after his arrival there placed his son, Sebastian, in a cotton mill, then known as Wagner's Mill, where he continued to work until

1843, when he was engaged by Mr. George Plunkett to learn the grocery business, and with whom he remained for three years. He was next employed by Hugh Curry as salesman, and continued with him until he became of age. Two days after attaining his majority, he went into the grocery and dry goods business on his own account, his cash capital consisting of $200, the amount of his savings. He continued in this for some years, but deemed it a slow way of making a competence, as he had meanwhile, January 27th, 1852, married, and finally he was persuaded by Mr. Heft to join him in the manufacture of paper. His youth was passed, it will be seen, in hard labor, and he could not avail himself of the advantages afforded by the public schools; but after his day's work was over at the mill, he received careful instruction at his father's hands, during his leisure hours.

MARTIN LANDENBERGER & CO., Manufacturers of Hosiery, Philadelphia, and Landenberg, Chester county. The extensive business of this firm had a very humble beginning. In 1843, the senior partner commenced the manufacture of stockings, at Germantown, with a single loom, purchased by means of his savings, and, necessarily, with an exceedingly limited capital. At first, he employed no assistance but worked diligently, with his own hands; and, though he began in what is termed "hard times," he succeeded, by his industry and thrift, in keeping himself afloat, and, at the end of the first year, had the satisfaction of being able to employ three journeymen in his little factory. During that period, his manufactures amounted to about $1000 worth of goods. His business steadily developed itself, from year to year, till 1847, when the country was affected by a financial panic which ruined many; he, however, having by prudent economy amassed a certain capital, was able to take advantage of the state of the market, by purchasing a considerable quantity of wool at a very low figure, and, when trade resumed its usual course, he found himself in a more prosperous condition than ever. In 1849, his business had so much increased that he was compelled to seek more extensive quarters, and, accordingly, moved into a new building containing eighteen looms. He was very desirous of introducing steam power into his mill, but his means were insufficient and he was forced to continue as before. In spite of this drawback, however, the demand for his goods continued steadily to increase with each year, and, in seven years, had grown so much as to oblige him once again to look out for more extensive premises, and to determine him in favor of the introduction of steam power. In 1856, therefore, he bought the site on which stands the present factory, at Germantown, and erected upon it one of the largest and most convenient stocking manufactories in the country. The dimensions of the building are 45 by 200 feet. It is four and a half stories in height, and is fitted up in all its details in the most complete manner, making it quite a model mill. The steel engraving opposite gives a good general idea of the building, but only represents, however, about one-quarter of the whole. Having thus increased his business facilities in one direction, he proceeded to do so in another, by admitting into partnership Charles Wyler and his two sons, Martin and Charles. In the year 1862, the business was still further extended, by the purchase of two branch factories, in Landenberg, Chester county, Pennsylvania, where the water facilities are unsurpassed by any in the State, and were, consequently, utilized as a motive power. This step was necessitated by the ever-augmenting demands of their trade, which has now attained very large proportions, the annual amount of merchandise, manufactured at the three mills, representing a value ranging from $800,000 to $1,000,000, and the number of hands employed in all their factories is from 1000 to 1200. All this has been effected in the space of thirty years, and may be attributed to the judicious manner in which the concern has been conducted, and also to the uniform excellence of the goods produced. Recently difficulties have overtaken the firm, but these are (February, 1875) in a fair way of removal, a proposition having been made which there is little doubt will meet with acceptance.

MARTIN LANDENBERGER is a native of Germany, and was born at Ebengen, in 1818. His father was engaged in the same business, at Wurtemberg, and, after giving his son a sound education, emigrated to the United States, choosing Philadelphia as his residence. His apprenticeship was served with M. Drenshaw, a native of France, and a stocking manufacturer in Delaware. With the latter he remained two years, and then engaged with Joseph Button, of Germantown, who carried on the first factory ever established in the vicinity of Philadelphia. He stayed with him till 1843, when, having saved sufficient money, he started for himself. He was married in 1846, and, in 1849, built a house opposite to his factory, to which he removed with his family.

Martin Landenberger

CHAMBERS, BROTHER & CO.'S FOUNDRY AND MACHINE WORKS, Fifty-second street and Lancaster avenue, Philadelphia. The founders and present members of the firm are two brothers—Edwin and Cyrus Chambers, Jr.—who commenced the manufacture of Chambers' Patent Book and Newspaper Folding Machine, January 1st, 1857. Since then they have gradually added to their business the manufacture of other valuable patented machines, as well as general machine work. Cyrus Chambers, Jr., the junior member of the firm, seems to have been an innate mechanic, and, as may be seen in his personal sketch, to have fashioned machinery from his very childhood. When but seventeen years of age he conceived, and, in subsequent years, perfected the folding machine above mentioned, beside inventing and fabricating the tools necessary in its construction. Receiving encouragement from his patrons, the late firm of Jesper Harding & Son (now William W. Harding), who used the experimental machine in folding quarto Bibles, he proceeded, in connection with his brother Edwin, to construct two other machines, and for this purpose the new firm rented a fifth-story room in Pemberton court, with *one-horse power*, purchasing such tools as they thought adapted to their wants and limited capital, and commenced. Then litigation ensued relative to their patents, and everything seemed to conspire against their success; but encouraged by their friends, particularly the house of J. B. Lippincott & Co., they persevered, contesting the ground inch by inch through the Patent Office, and the United States courts of Massachusetts and at Washington, employing the best counsel and experts attainable. These legal troubles extended over a space of eight years, and cost them many thousands of dollars. During all this time, however, they continued to experiment on the folders, and succeeded in devising the now successful book machine. Two machines, meanwhile, had been completed, one for J. B. Lippincott & Co., and the other for Talmage Bros., both of which have been running ever since, each frequently folding 172,000 pages in a single day. Harper & Brothers of New York obtained one for their magazine, and were so well pleased that they do their work exclusively by these machines, and other publishers followed suit. They next engaged in the manufacture of a sewing machine, which necessitated a change of locality to a more extended space, and a large room in the Sherman building, southwest corner of Seventh and Cherry streets, was procured, to which they removed in the fall of 1860. It was but the eve of the great rebellion, which broke out in April, 1861, and their establishment was then adapted to the manufacture of cavalry scabbards, and the conversion of flint-lock muskets into percussion. During the years 1860-'61, the machine now known as "Chambers' Brick Machine" was devised and reduced to practice. Many experiments were necessary, not only testing the principles involved—the mechanical contrivance—but also the philosophical working of the clay. The machine was constructed, weighing twelve tons, and put, after a slight temporary failure, into successful operation at Pea Shore, New Jersey, under the charge of two other brothers, William and Maris Chambers, who ran it successfully for years, overcoming the difficulties and prejudices of introducing a new article of manufacture. Since that time the machine has rapidly and steadily gone into the market, and may be seen in almost every State of the Union, from Maine to the Gulf, and from the Atlantic to the Pacific. In the early part of 1864, the business was removed to Thirtieth and Chestnut streets, where the old building was modified to suit their purpose, an iron foundry was erected, and gradually other buildings were put up and from time to time extended. But in the course of a few years even this locality became too circumscribed, and eventually, in 1871, they again removed to their present quarters, where they have abundance of room, with new and well-planned buildings, which occupy nearly 200 feet on Fifty-second street, with three wings running back. The finishing shop is 107 by 45 feet in the clear and three stories high; is heated by steam, lighted by gas, and has all necessary adjuncts for the convenience and safety of the employés, besides the tools and machinery for the production of the various articles there manufactured. The foundry is 50 by 80 feet, fully and perfectly equipped. A notable feature in the manufactures of the firm is a machine recently perfected for folding and pasting at the backs of magazines, newspapers, almanacs, etc., which is coming into general use. Among its patrons may be mentioned the proprietors of the *Scientific American*, Boston *Globe*, *Schenck's Almanac*, etc. The *Christian Union* and New York *Independent* also use the same for their weeklies, which now appear in the form of a magazine. The firm are now (February, 1875) constructing a similar machine for the *Sunday-School Times* of Philadelphia, so as to present that journal in a more convenient form to the reader than the full sheet folio. The total of the many sizes and varieties of these machines are *three hundred and fifty-eight*. These are in use in all the large cities of the Union, beside being patronized by heavy publishers abroad; the

firms of Virtue & Co., London; Thos. Nelson & Sons, Edinburgh, may be named in this connection. The firm also manufacture "Chambers' Embossing Press," which can sustain a working pressure of 100 tons; the "Mashing Machine" for pressing books; "Chambers' Automatic Board Cutter" for cutting binders' boards; also a "Patent Cutter" for slitting paper as it runs from the printing press before reaching the fly. The business of the firm is, as may be imagined, continually augmenting, and is becoming more and more lucrative. The royalties on the brick machine have reached high figures, a very large sum having been paid for the State of New York alone. The firm attribute their success to their untiring industry, their indomitable perseverance in overcoming every obstacle, and also to the necessity of their labor-saving machinery, which has not only worked a revolution in the manufacture of bricks, but has entered the printing office and book bindery, and effected a marvellous change therein.

EDWIN CHAMBERS was born in Chester county, Pennsylvania, in 1827. He is the fifth child of John P. Chambers, of Kennett Square, a woollen manufacturer, and a member of the Society of Friends. He was in the factory with his father until he was twenty years old, receiving a public school education during the winter months only. He next studied dentistry, which he practised in his native village, with credit and success, until the close of 1856, when he became associated with his brother Cyrus in the manufacture of machinery.

CYRUS CHAMBERS, JR., is the ninth child of a family of thirteen. At six years of age he became a "bobbin boy" in his father's factory, and when not at work was to be found in the repair shop, familiarizing himself with the tools. He built water-wheels, windmills, tilt hammers, sleds and wagons in profusion. At the age of eight he made a hay rake, which he sold for eighteen cents—the first money he ever received for his mechanical efforts. About this time he built an overshot water-wheel, to which was attached a complete model of his father's mill, remarkable for its completeness of detail. When ten years old, he aspired to build a locomotive engine, which he completed in pewter, but the nature of the material would not allow of its being effective. He next constructed a stationary steam engine in brass, which has been in one of our Philadelphia schools, being used to illustrate the principles of the steam engine. At fourteen he constructed a complete Morse electric telegraph, and operated it successfully. When fifteen he desired to become a machinist, but was persuaded by his father and brother Edwin to study dentistry. Before he was sixteen he constructed the "Golden Miniature Steam Engine," the smallest working engine in the world. It was exhibited at the New York World's Fair, and, among others, at the great fair for the United States Sanitary Commission in 1864. The entire engine—boiler, stack and bed-plate—is fashioned from gold and silver, and altogether weighs less than half an ounce! It has received the highest premiums, besides the universal approval of the public press. Dentistry not being to his taste, nor his forte, as the foregoing sketch of his various labor-saving machines testifies, he abandoned the forceps and plugger and became a machinist, with the results above noted.

DWIGHT B. FULLER, Manufacturer of Aerated Bread, Crackers, Cakes, etc., was born in Connecticut, in the year 1815. When he was but an infant, the family removed to the vicinity of Rochester, New York, where his father settled on a small farm, erecting a log house, and followed his trade of shoemaking. Shortly after the opening of the Erie Canal, in 1825, he began the life of a boatman, making his trips from Lockport to Albany and return, occupying six weeks—his little son being employed to drive the horses. In 1826, the father died, and the mother, with her four children, removed to Buffalo, where Dwight, the eldest, obtained employment in a tobacco factory, but finally was sent to Ohio, where he served an apprenticeship of three years to learn farming. When he was about fifteen years of age, his mother married again, and he proceeded to Utica, New York, to enter the employ of his step-father; but being dissatisfied, went to a neighboring town, where he found a situation in a country store whose proprietor was in ill health. He remained here until the merchant was obliged to relinquish his business, and then made his way to New York city, where he became clerk in a Yankee notion establishment. After familiarizing himself with the business, and with his small capital of $150, the savings of many a year, he commenced trading on his own account, selling wares by sample throughout the city. About the year 1845, he was joined by his brother, and they continued the business for some fifteen years, until failing health compelled him to abandon it. In 1862, he commenced the manufacture of aerated bread in Buffalo, New York, and in the following year at Rochester. In 1865, he purchased the ex-

tensive establishment in which he is at present located, in Philadelphia, and, in connection with his brothers, has since engaged in similar undertakings in Newark, New Jersey, and New York city. He was among the first who succeeded in bringing the manufacture of aerated bread to perfection; and with that persistency of purpose and unabated energy which had thus far carried him safely through so many changes in life, he devoted all his energies towards rendering his manufactory second to none other in the country in its reputation for the articles produced. The building in Philadelphia—Nos. 10, 12, 14 and 16 South Eighteenth street—is 70 feet front and 125 feet deep, two stories high, with paved cellar running underneath the whole edifice. The retail department and offices occupy the front of the establishment, and immediately in the rear is a wagon way, where the productions are loaded for shipment, and which being under cover, all danger of goods being damaged by rain is obviated. In the rear of this latter is the bakery—large, roomy, and well appointed in every respect. In the manufacture of bread the flour is sifted in the second story, and run down through a hopper into a vessel termed the "meter," of a globe shape, made of iron one and a half inches thick, having been previously mixed with water. The carbonic acid gas which is used to raise the dough, instead of yeast, is formed by the action of sulphuric acid on marble dust. Two powerful steam pumps force the gas into the meter until there is a pressure of 180 pounds. A revolving shaft with iron fingers runs through the centre of the meter, and these fingers pass between stationary ones in the meter, by which action the dough is thoroughly mixed. After being thoroughly saturated with gas, the dough is ejected through faucets —at the base of the meter—into previously prepared pans, and it is now ready for the oven. Two barrels of flour can be thus prepared every hour. There are two large reel ovens and one tile oven: the two former have each a capacity of fifty barrels per day. Crackers and biscuit are also manufactured in large quantities, of every variety, from the highest grade of flour. When taken from the ovens they are placed in wire baskets and removed to an air-tight, iron-lined room, directly above the ovens, where they are kiln-dried, thus rendering them crisp, brittle and delicious. Cakes are also manufactured in countless variety, to which is almost daily added something new. This is a specialty in this establishment, and the inventive genius of the proprietor has produced a machine—for which he has been granted letters patent—which will accomplish more work in one day, with two operatives, than could formerly have been effected with threefold the number, besides making the cakes uniform in size and more handsome in appearance. Two of these machines are in constant operation. The capacity of the establishment is over 100 barrels of flour per diem. Two handsome steam engines furnish the motive power; one of twenty-five horse for day work, and the other of ten horse for night turns. Two steam elevators run from cellar to roof; one for conveying the crackers and cakes from the baking to the packing room, on the second story; and the other for lowering and hoisting flour, sugar, molasses, etc., to and from the cellar. Fifty hands are constantly employed; nine wagons and eleven head of horses and mules are engaged in delivering goods to railroad depots, boats, and to the numerous city customers. Two travelling agents are continually on the alert soliciting orders, and the trade is continually augmenting. In 1872, W. H. Palmer, who had been associated in business with the proprietor for some time, was admitted as a partner, and on January 1st, 1874, George B. Pickens assumed an interest in the establishment, the firm being styled D. B. Fuller & Co. The success of this establishment is to be attributed to the superior quality of its products, nothing but the very best of material being used, the most careful workmanship which is bestowed upon it, and the cleanliness which pervades the entire premises, so different from many establishments of a similar nature.

CHARLES ELLIS'S SON & CO., Manufacturing Chemists, Philadelphia. The founder of this firm was Charles Ellis, who, in 1826, associated himself with the late Isaac P. Morris, and purchased the establishment of Elizabeth Marshall, who was the successor of her father Charles, and her grandfather Christopher, the latter having established the store (old) No. 56 Chestnut street in 1740. The firm of Ellis & Morris at once took a front rank in the drug business, which, without being exclusively retail, now gradually developed into the wholesale line. After some years of successful management and increasing prosperity, Mr. Morris withdrew from the concern, and directed his energies into another channel. In the year 1837, Mr. Ellis admitted his nephew, William Ellis, into the firm, which became known as Charles Ellis & Co.; and subsequently his son, Evan T. Ellis, was added to the business, without any change in the name of the house. These gentlemen continued to give the

business their constant and undivided attention In 1857, they removed to No. 724 Market street, where, in a larger building, they were enabled to afford better accommodations to their great force of operatives and increasing number of patrons. They were extensive manufacturers of blue pill, mercurial ointment, spread adhesive plasters, roll plasters, Ellis's citrate of magnesia ; the new remedies, such as the hypophosphites of lime, soda, iron ; chemical food, etc. ; together with a great variety of standard chemical and pharmacentical preparations. In 1863, William Ellis retired from the firm, and William M. Ellicott, Jr., a son-in-law of the senior partner, was received into the house, the firm name being changed to Charles Ellis, Son & Co. In 1868, the establishment was removed to the massive warehouse at the southwest corner of Market and Tenth streets, which had been especially built for them, and they here carried on a very large and remunerative business. In 1871, Charles Ellis withdrew from the firm, and in the following year Mr. Ellicott also retired. The business is continued by Evan T. Ellis, who has associated with him W. H. Boyle, who had long been connected with the establishment, and the style of the firm is now Charles Ellis's Son & Co.

CHARLES ELLIS was born in Lycoming county, Pennsylvania, in the year 1800, and was educated in a school on Manhattan Island. In his sixteenth year he came to Philadelphia, and was regularly apprenticed to Elizabeth Marshall to learn the apothecary's art. He served his time faithfully, and when he attained his majority was retained in her employ as one of her assistants to carry on the business, in which position he remained for several years to her entire satisfaction, and until by purchase he became part owner of the establishment. During his long and eventful life, much of his time and attention was given to various charitable and other institutions with which he was connected. He was for nearly twenty years President of the Philadelphia College of Pharmacy. He was also a Manager of the Friends' Asylum for the Insane, Frankford, Philadelphia ; and of the House of Refuge, for the reformation of the vagrant youth of both sexes. The Orthopœdic Hospital and Infirmary for the cure of nervous diseases numbered him among its earliest trustees and advisers. He also held important trusts for the Friends' Meeting, all of which he discharged to the satisfaction and credit of that important body. A man of excellent constitution and steady habits, he enjoyed good health up to within a short period of his death, which occurred toward the close of 1874.

WAYNE IRON AND STEEL WORKS, Brown & Co., Pittsburgh. This establishment was founded in the year 1820, by M. S. Mason, an English merchant, who associated with him Mr. McDonough. They were engaged for five years in rolling iron, when they disposed of their interests in the concern, in 1825, to Mittenburger & Brown, the latter being the father of the present proprietors. In 1842, these gentlemen retired, the present senior partner of Brown & Co. taking his father's interest, and Messrs. Bailey and others the remaining interest. This new firm of Bailey, Brown & Co. enlarged the works and added to their productions the manufacture of steel. In 1861, the present senior member of the firm purchased his partners' interests, and subsequently associated his brother with him, constituting the present firm of Brown & Co., who have largely increased the capacity of the works, introducing several specialties in both steel and iron of approved quality into their make. The Wayne Works are well known for the uniform superior quality of their brands of iron ; the quality has never been permitted to deteriorate, nor is it ever proposed it shall. In 1861, when the war of the rebellion broke out, and while the first iron-clad vessels were being constructed for the United States Navy, Mr. Merrick, one of the contractors, prevailed on the firm to fabricate the armored plates. At first they hesitated, but finally undertook the task, and, being determined to succeed, did succeed, and that beyond their most sanguine expectations. Thus they manufactured a large portion of the four-inch thick hammered armor plates, and which were the first made in the country, used in plating the frigate "New Ironsides," the first regular iron-clad ship built for the government. Previous to the outbreak of the rebellion, and indeed for some time thereafter, all the iron used for making muskets was imported from Europe. In an interview between the Superintendent of the Springfield Arsenal and the senior partner, the latter stated that the firm would enter into competition with the foreign manufacturers ; nor were they unequal to the task, for at a subsequent period they forwarded a specimen of their make to be tested ; and after the most rigid tests had been applied to the same, it was pronounced by the government officials to be equal in every respect to any they had ever used ; consequently, they received large orders from the United States for this quality of iron. After the termination of the war they continued to manufacture the same character of iron, for which, as it was first made for the Government of the United States, they adopted the

brand of "U. S.;" and this same grade of iron has since made itself famous, being widely known East and West, and rivalling the most celebrated irons of Europe. The firm are the owners of the cold-blast charcoal furnaces, as also of the mines whence the ore is procured, from which they manufacture the blooms for this iron, thereby always insuring a most uniform superior quality, which it is their constant endeavor and aim to keep equal to any made. From this stock is manufactured, in addition to bars of all sizes, their celebrated United States boiler plates, which the Government, after testing with the finest plates made in the country, pronounced as the best ever tested at the navy yard at Washington. The United States officers sent to the firm, unsolicited, a certificate to that effect. The works are located at Tenth street and Duquesne avenue, Pittsburgh, and occupy three and a-half acres of ground. There are on the premises five steam engines, and two steam hammers from three and a-half to four tons weight and of 5 feet stroke. In the rolling mill are three trains of rolls, beside the sheet rolls, and about 3000 tons of rolled steel are yearly made. The entire capacity of the works aggregates 10,000 tons of iron and steel per annum; and the firm employ constantly 400 hands in their production.

JAMES BROWN, the father of the present proprietors, was of Scotch-Irish birth, a most enterprising man and a partner in several manufacturing interests at Pittsburgh. During his long life and residence in that city he enjoyed the respect and esteem of his fellow-citizens in an eminent degree. The present senior member of the firm was bred a merchant, but on the retirement of his father, in 1842, he purchased the latter's interest in the works, and for the past fifteen years has devoted himself to the manufacture of iron and steel as a profession, exclusively. His brother, and the junior partner, is an active, intelligent and efficient iron master, which has been the only pursuit of his business career; and the successful result of his intelligence and industry—in the high standard of the firm's makes of iron and steel—is his just reward, as it is his honest pride.

D. F. AGNEW & CO., Manufacturers of Black Lead Crucibles and Stove Polish, Pittsburgh. This firm dates from July 2d, 1872, at which date they purchased thirty lots of ground, situated on the bank of the Ohio river, in the centre of Allegheny City, near the new Union Point bridge, at the junction of the Allegheny and Monongahela rivers. The ground enclosed contains about two acres. On this site they have erected a substantial brick building, four stories high and measuring 125 feet long and 100 feet wide, with eight dry kilns, 26 feet square each. The boiler house and burning kilns are separate structures, but attached to the main building by a covered passage way. The machinery is very complete, and much of it entirely new, a portion of it unlike that in any other establishment; and the character and extent of the works are not equalled by any other in the world. The building and grounds are sufficiently extensive to manufacture all the crucibles used west of the mountains; in fact, their capacity is unlimited. The capital necessarily employed in an establishment of this nature is a heavy one. When in full operation and demanding large expenditures for the raw material, $200,000 is required. The value of the articles produced averages $350,000 yearly. The quality of the manufactures is of the best, as are also the ingredients employed, these being Ceylon plumbago and German clay. Two or three years ago, a crucible that could be used three times for melting steel was considered a good article; but, owing to progress in the business and a departure from the old beaten track, a crucible to be considered very good must stand six meltings. Now this establishment has made crucibles that have withstood *eight* meltings without the use of a wash. This quality or character of crucible is by far superior to any other yet produced in the United States; and as an evidence of the fact, the first premium—a silver medal—was awarded to the firm at the Fifth Cincinnati Industrial Exhibition, 1874. One of the peculiar features of the business is that the preparation of the articles is a secret; therefore the details of the various processes cannot be given for publication. The present capacity of the works averages 400 crucibles daily, and 100 gross of stove polish; the latter article also obtained the first premium at Cincinnati, in 1874. The success of the establishment is attributed to the fact that science, confirmed by practical results, has led the firm to attain the highest standard of excellence in every article which they offer to the public.

D. F. AGNEW was born in Westmoreland county, Pennsylvania, in 1821. For eight years previous to his inception of the crucible works, he was extensively engaged in the manufacture of boilers, on Twentieth street, Pittsburgh. He is now devoting his best energies to establish a business that must prove successful. In this great enterprise he has the assistance and co-operation of his sons, who are associated with him.

ENTERPRISE STEAM CABINET AND BUILDING WORKS.—The proprietor of this establishment, Osmar B. Gentsch, is a native of Germany, where he was born September 17th, 1840, and is the eldest son of Henry J. and Eva Gentsch. His father becoming involved in the German Revolutionary troubles, in 1848, deemed it prudent to escape from the fatherland, and emigrated to America, whither his family followed him, and at first settled in Philadelphia, in the public schools of which city Osmar B. received his first education. At a later date, the family removed to Camden, the child meanwhile continuing to attend school in the first-named city, where, by his proficiency in drawing, he was enabled to carry off the first prize in this branch of study; but the discovery being made that his parents resided in Camden, it was decided that he was not entitled to any benefits to be derived from the schools he had at first entered; so he was obliged to finish his academic learning in a private school, there being at that time no free schools in the sister city of New Jersey. He assisted his teacher in various ways, and finally in acting as usher, his services thus rendered being considered as an equivalent for tuition fees. Being of an industrious as well as of a studious turn, he was never idle, and his evening hours were utilized as well as those of the daylight. When thirteen years of age, he learned to make daguerreotype cases, and covers for perfumery bottles, but the business being unsuitable, he next became errand-boy in a publishing house, and for three years was so engaged, rising to the position of salesman, meanwhile employing his leisure hours in study, and also as a member of F. Thomas' orchestra. When eighteen years of age, he commenced learning the cabinet-maker's trade, and, with his proficiency in drawing, designing, and executing in wood carving the ideas which he had conceived, he thoroughly mastered the art, and, at twenty-two, started in business for himself at No. 208 Brown street, his capital being two dollars and a half, which he invested in tools. He here remained a year, and the civil war having broken out, he left the management of the business to his father, while he joined the "Turners," who contemplated offering their services to the Government. After some time passed in drilling, and learning military manœuvres, the Secretary of War, Simon Cameron, refused to accept the organization, and he thereupon relinquished his intention of joining the army. About this time he resolved, in accordance with the customs of the fatherland, to travel and perfect himself in his calling, which he did by visiting all the principal cities of the Old World, especially England, France and Germany, gathering everywhere new ideas relative to the manufacture of choice articles of furniture, as well as increasing his stock of designs and patterns. On his return to America, he once more sought his modest workshop, and labored there for a year; but, becoming convinced of the absolute necessity of steam power, he associated with him a young German friend—Claus Schlesselman—and started afresh in part of the fourth floor of an old building on Spring Garden, west of Broad street, the present site of the Enterprise Works. The amount invested here was $250, and the business prospered, insomuch that it was necessary to occupy the whole of the fourth floor. His partner, not having the courage to increase his responsibilities, decided to dispose of his interest to the other, which he did, receiving $700 for his share, but he continued with him, even until now, as his foreman. Much of the machinery in use was of their own devising. After the dissolution of the firm, the third story of the building was added to the manufactory, and, in 1869, the owner of the property proposed that he should lease the entire building, of which he was to obtain possession in January, 1870; but the tenants not being ready to relinquish the first and second floors, the matter was postponed until March. Meanwhile, on February 5th, by an act of incendiarism, the mill was burned down. He had an insurance of $7000 effected on his machinery and stock, but received only $2000, the remainder being due by companies which were unsound. He, however, received from these some real estate in Chicago, which at a later day proved of value. Two days after the fire, he commenced operations looking to a renewal of his factory; and, by untiring efforts and with no loss of time to his hands, twenty-five in number, he succeeded in starting again on April 25th, eleven weeks after the disaster. In 1872, he purchased the property fronting on Brandywine street, at the rear of the mill, and erected thereon a four story warehouse, fronting on that street and running through to Spring Garden street. His rooms for finishing purposes are located at the corner of Eighth and Spring Garden streets, the separation from the mill and warerooms being necessitated by the dust. In 1873, he opened a branch store on Broad street, north of Poplar, which is under the management of Jacob Zilz. His business is in an exceedingly prosperous condition. He manufactures not only for the home market, but sells largely to Boston, New York, New Orleans, Baltimore, Washington, Pittsburgh, Chicago, and St. Paul; also to the principal cities and towns in the country. During the

first year, his sales aggregated but $10,000; these are now increased to $150,000. In place of the small workshop of former days, he now occupies 11,000 square feet of surface. The one solitary artisan now has seventy-five hands employed, and all his old mechanics remain with him; of his five apprentices, two are yet in the workshop as journeymen; and the slender capital of two dollars and a half, in 1861, has increased to $60,000, in 1874. This growth is the result of strict attention to business, energy, enterprise, and a desire to be alive to the demands of the times, the articles produced at these works being of the higher class of new designs, which are unique and constantly undergoing improvement.

THE HOSIERY MILLS OF CONYERS BUTTON & CO., Germantown, Philadelphia. This extensive establishment was founded by John Button, the father of the present principal proprietor, in 1831. He was a native of Leicestershire, England, and emigrated to this country in 1830. His father, Joseph Button, was a lace manufacturer of that section. The son, at the time of his leaving England, was the owner of two small machines for knitting hosiery, which, under the then existing laws, he succeeded in having passed through as "tools." On arriving in Philadelphia, he at once put his machines into operation, and for twelve months manufactured children's socks. These, being made in a superior manner and being much less expensive than the hand-made article, commanded a ready sale. Being the only manufacturer of hose by machinery, he enjoyed a monopoly of the trade for a number of years. Attracted by the natural advantages of Germantown and the low rates of living in that rural district, he removed thither. Renting a small building on the brow of "Negley's Hill," near the site of Henson Brothers' present mill, he set up his two machines, to which he soon after added eight others. His great success in the manufacture of children's socks induced him to undertake the manufacture of men's hose. This enterprise was equally fortunate in its results. Not only was he the founder of a large establishment of his own, but under his instruction many of those now at the head of similar industries learned the art of making knit goods by steam power. In fact, John Button's little factory was the nucleus of the great hosiery manufactories of the present day. The echoes he awoke with his two small machines in the then wooded village of Germantown gathered strength, and are still reverberating far and wide. "Germantown knit goods" are familiar to the inhabitants of every city and village in the United States. In 1835, his increasing business demanded more room and greater facilities. He purchased three acres of land at the corner of Main street and Walnut lane, and erected a building of sufficient capacity to accommodate his machinery. At that time he employed about twenty-five hands and produced goods annually to the value of $20,000. It soon became necessary to enlarge this building, and its present dimensions are evidence of how often this necessity occurred in the ensuing thirty or thirty-five years. For many years Conyers Smith, a brother-in-law, was associated with him, but not from the first. He was not a practical manufacturer, but became interested in the business through the family connection. He withdrew in 1851 and returned to England, possessed of an ample fortune. The senior partner now admitted his eldest son, Joseph Button, into partnership, whose business qualifications added materially to the growth of the manufactures. In 1861, the father retired from the business which he had so successfully prosecuted for thirty years. He lives in retirement, in a substantial old-fashioned house fronting the mill property, a dwelling that is admired for the strong growth of hedge surrounding it. He is very vigorous for his advanced years, and still takes a lively interest in the business he founded. In 1865, Joseph Button withdrew, and his brother, Conyers Button, became the sole proprietor of the business, and to this day maintains the position which his father secured for himself and the manufactory. Four years later he admitted his nephew, Theodore A. Fleu, into partnership, and the firm now has the style and title of Conyers Button & Co. These gentlemen avail themselves of every improvement which may from time to time enter into the manufacture of woollen knit goods, and conduct their business on careful but liberal principles. Their manufactory comprises a handsome group of buildings covering a large extent of ground. These buildings are kept in the neatest order as to exterior, and in this respect vie with the many handsome residences with which they are surrounded on all sides, while the interior is a model of perfect system and cleanliness of appearance. The counting-house is one of the finest in Philadelphia, while the engine room is a marvel of new-pin brightness and studied ornamentation. The mills give employment to a large number of hands, male and female, and the amount and value of the goods manufactured is very

great. The proprietors are gentlemen of culture and refinement, and the senior partner contributed largely of his means to the building of the handsome church of the Unitarian Society, at Germantown, and is a prominent supporter of that congregation.

THOMAS WIGHTMAN & CO., Glass Manufacturers, Pittsburgh. This house is one of the oldest of its kind in the State, having originated in 1840, the style of the firm then being known as William McCully & Co., the "Co." consisting of Frederick Lorenz and Thomas Wightman. Previous to the formation of this firm, William McCully was the proprietor of a vial house, which he had erected in 1833; it was located on Liberty street, Pittsburgh. Frederick Lorenz was the owner of three window glass factories, two of which were situated on South side, opposite Penn street, and the other at Sligo, opposite Wood street. These works had been successfully operated by their owner for a number of years, although for some time previous to 1833 he had leased them to Sallsbury & McKee. In 1838, McCully & Lorenz became associated in the manufacture of window glass; and in 1840 they combined their glass and vial works, and, Thomas Wightman being admitted as a partner, thus constituted the firm of William McCully & Co. The consolidation of these interests placed the firm in the front rank of the glass manufacturers of the State. At this time they employed about 100 hands, and their annual productions were estimated at $125,000. This amount increased from year to year, as they extended their trade, and so rapid was the growth that in three years Mr. McCully purchased another vial house, located in the Twelfth Ward, which had been erected by Fahnestock & Gladdens. In 1851, the firm of William McCully & Co. was dissolved, and Frederick Lorenz and Thomas Wightman became partners, under the name of Lorenz & Wightman. This firm retained the works owned by the senior partner; they likewise erected a window glass and vial house on South side, opposite Penn street, adjoining the old works, which had been in operation in that locality from the year 1797, and which were the property of Frederick Lorenz. In 1854, Mr. Lorenz died, and in 1856 Mr. Wightman retired from the business for a time, but the firm-name of Lorenz & Wightman did not finally terminate until its formal dissolution, in 1873. In 1864, Mr. Wightman resumed his business of glass manufacturing, and soon acquired his old position in the trade, and has held the same to the present date. The present firm embraces, besides the senior partner, his three sons, J. R., J. S. and A. S. Wightman, all of whom are practical and energetic business men. A. and W. K. Nimick are also members. The works consist of three glass and two vial houses, located as follows: two glass houses in the Thirty-fourth Ward, or West Pittsburgh; a vial house connected with these works has been recently removed by the opening of Carson street in that ward; one vial house in the Twelfth Ward, and the "Eclipse Works," which are situated in Temperanceville, or the Thirty-sixth Ward, Pittsburgh. These last mentioned works are the individual property of Thomas Wightman, who purchased them in 1871 from Fahnestock, Albree & Co. They are said to be the most costly works of their kind ever erected in the United States, and for perfection of arrangements and appurtenances are unequalled. The firm now employ, when working to their full capacity, from 400 to 450 hands, and in this case their annual products may be stated at three-quarters of a million of dollars. The excellent quality of their wares is attested by the extensive trade they command; and they have at present the greatest capacity for manufacturing of any house in the trade. Of vials they are very extensive producers, and they are prepared to manufacture any and all sizes and styles, from the most diminutive vial up to and including an eleven gallon carboy; of the latter article they make a large number annually. They are probably the heaviest producers of vials in the State; the senior member being the oldest manufacturer of these articles in the business, as also one of the oldest in the window glass line. The firm also manufacture very largely the old "Mason" porcelain-lined fruit jar, and in this article have secured a first-class reputation throughout the country.

THOMAS WIGHTMAN was born January 8th, 1818, in county Down, near the city of Belfast, Ireland. He came with his parents to the United States in 1825, and the family settled in Pittsburgh. His education was obtained at the Phœnix Seminary, in that city, under the charge of Professor Campbell. When thirteen or fourteen years old, he left school and entered a wholesale grocery and queensware store in Pittsburgh, where he was employed for several years. On leaving this establishment he effected an engagement, in 1834, with William McCully, and continued with him until he became a member of the firm, in 1840. This latter position he had earned by his diligence in business, coupled with the able management of affairs,

ECLIPSE GLASS WORKS

Thomas Wightman & Co. Pittsburg. Pa.

which had been intrusted to him. He had thus, by his own exertions, placed himself as a member of the largest glass producing establishments in the State. Through all the changes that have occurred in this house, he has maintained this position, excepting from 1856 to 1864. He had retired from the business but a short time prior to the great financial panic of 1857, when his services were sought by some parties who had succumbed to the storm, and he was engaged to settle their affairs. Returning, in 1864, to his original business, he has since continued the prominent position he ever occupied. He is closely identified with the banking interests of the community, having been one of the organizers of the First National Bank, and has been a director in that institution from its inception up to the present time; it had been originally established as the Bayardstown Savings Bank. He is also a director in the People's Savings Bank, of Pittsburgh. Although rigidly avoiding politics and politicians, he is fully alive to all matters concerning the public weal, and, in consideration of his fitness to secure their interests, he has been chosen one of the directors of the Reform School of Western Pennsylvania, an institution which requires to be managed by those who are outside of and above the influences and intrigues of partizanship. He is also a director in the Pennsylvania Female College, located on Fifth avenue, which, although under the control of Presbyterians, is nevertheless a non-sectarian institution, and is patronized and attended by all classes and creeds. In his own immediate business, he may be termed the father of the trade; and his strict integrity, as well as courtesy in his entire career, have gained for him the esteem and confidence of all with whom he comes in contact. He was married, in 1845, to Isabella R. Russell, of Pittsburgh.

CHAMBERS & SANBORN (Charles Chambers and Emery A. Sanborn), Carriage Builders, Germantown, Philadelphia.—This manufactory and repository was founded by Charles Chambers, in 1870. He was a practical carriage builder, and came to Germantown and established a manufactory near the corner of Main and Mehl streets. It was a hazardous venture, in view of the fact that there were several old-established manufactories in the place at the time, and that he was a perfect stranger in the community. But there was an opening for him, and the enterprise was very successful from the start. He employed from twenty to twenty-five hands in the building of light carriages and in doing job work, and was almost at once in the midst of a flourishing business. He employed the best mechanics, and was himself a skilled workman. After carrying on the business for three years, he associated with himself Emory A. Sanborn, a native of Maine. This partnership was entered into in May, 1873. Deeming a change of location advisable, the firm purchased a lot on Chelten avenue, near the Philadelphia, Germantown & Norristown Railroad Depot, which of late years has become quite an advantageous business thoroughfare. This lot, 87 by 130 feet, runs from Chelten avenue to Bowman street, having a front on both. They immediately commenced the erection thereon of a handsome building, three stories in height, with a frontage of 84 and a depth of 40 feet; also an L extension, two stories, and 28 by 50 feet, to be used as a manufactory and repository, and occupied it as such early in 1874. The capacity of the building will admit of the employment of from fifty to sixty hands, but not more than one-half that number has ever as yet been employed. The senior partner superintends the manufacturing department, while the junior attends to the office business.

CHARLES CHAMBERS was born near Newtown, Bucks county, Pennsylvania, in 1834. At the age of sixteen, after receiving a common school education, he was apprenticed to learn carriage making, etc., at the village of Hulmeville, in his native county. After finishing his trade, he worked at Newtown and Centreville, same county, and at Hatboro', in Montgomery county. In 1857, he started in business for himself, in a small way, at Centreville, removing to Abingdon, Montgomery county, in 1863, where he rapidly built up a thriving business. At the end of seven years (in 1870), he found himself the employer of twenty-five men, the starting point of which was his own labor unaided. He came to Germantown in that year, and made bold to compete for a share of the business of that wealthy suburb of Philadelphia, and has been so far successful as to make his manufactory the largest of the kind in that section.

EMERY A. SANBORN was born in Kennebec county, Maine, April 28th, 1842. After preparing for college, he commenced the study of medicine, but owing to impaired health was obliged to abandon it for active business, in which he engaged as a member of the firm of James A. Sanborn & Sons, oil cloth manufacturers. He was occupied in the selling of oil cloths in New York and Boston

till the retirement of the other members of the firm, when he took charge of the manufactory, which he retained till disposing of it by sale, January, 1872. Becoming acquainted with Mr. Chambers and his business, he believed, with him, that with additional capital it could be largely extended with profit to both, and formed a five years' partnership in the spring of 1873.

J. B. LIPPINCOTT & CO., Book Publishers. The present firm are the successors in business of a house which was founded in the eighteenth century. The senior partner, after having been engaged in the book trade on his own account for several years, at the southwest corner of Race and Fourth streets, continued there until 1850, and by his genius and energy made a fortune; but instead of retiring from business, he had the enterprise to purchase the stock and good-will of Grigg, Elliott & Co., at that time the largest book jobbing house in the country, then occupying premises on Fourth street north of Market. At this location, under the firm name of J. B. Lippincott & Co., he remained until 1863, when the house removed to the present magnificent establishment, Nos. 715 and 717 Market street, which had been previously erected for the uses of the firm. The building is five stories high, having a front of 41 feet on Market street, and extending north 365 feet to Filbert street. In 1871, the large buildings fronting on the latter avenue, and situated east and west of the main edifice, were erected for the manufacturing department of the house; so that the establishment, which is one of the largest in the country, may be said to have its several branches concentrated under one roof. Book publishing is a veritable art, for not only are the mechanical details to be carefully attended to, but the house must be assured that the material submitted to them is a merchantable article. The "reader", or "editor" becomes thus the jury and judge to determine if the manuscript is worthy of publication, and if it successfully passes this ordeal, and is pronounced a saleable article, the "copy" is sent to the composing room, where, after it is set up in type, and properly corrected, it is stereotyped and ready for the press. The printing is attended to on the premises, as also the binding and finishing ready for the salesroom or for shipment. It is far more economical to stereotype the pages than to keep the forms of type standing; and the firm endeavor to preserve each work published by them ready for a second or third edition whenever called for. In the sub-cellar of the establishment, in great vaults far down below the surface of the street, are stored over half a million dollars' worth of stereotype plates, all enclosed in strong wooden boxes, with the name of the work distinctly stencilled on the outside. The cases are disposed of street-wise, every avenue having its name, every box of plates its designation turned toward the avenue. A directory, carefully prepared, gives the exact location of all the works that have been stereotyped. This system enables the firm to handle any particular plates needed at a moment's notice. The large buildings on Filbert street are as near fire-proof as it is possible for iron and brick to make them. The staircases throughout are of iron, so also are the shutters and doors; while the great square wells of space, which constantly admit light and air, serve to cut off close communication between the piles of building, and thus form a natural barrier to the spread of flames should a fire occur. All the workrooms are large, well lighted and ventilated, and a pervading air of cleanliness favorably impresses the visitor. The first floor fronting on Market street contains the retail department, has a depth of 365 feet, and is entirely filled with books on shelves, counters, tables, racks and in drawers. Under this great hall is a basement of the same dimensions devoted chiefly to school books. In the manufacturing department of this wholesale book-producing house 450 persons are employed, while the salesrooms require 100 clerks, book-keepers and salesmen. It is not exactly known how many tons of paper are annually consumed by the firm, but they sell and ship off annually hundreds of tons of books. In addition to their new and standard publications, they issue every month *Lippincott's Magazine*, a popular periodical of literature and science; the *Philadelphia Medical Times*, a weekly journal of medicine and surgery; the *Teacher's Record*, and a *Monthly Bulletin*, relating exclusively to the book trade. Many of the publications emanating from this establishment have been large enterprises, requiring years of preparation and a large outlay of capital before any return has been obtained. Among these may be cited the *Biographical Dictionary*, which occupied over twenty years of steady labor; the *Gazetteer of the World*, *Allibone's Dictionary of Authors*, and the reissue of *Chambers' Encyclopædia*. Among the works from their press may be mentioned elegant editions of the writings of Prescott, Irving, Scott, Dickens, Bulwer, Thackeray, Macaulay, Addison, and other famous authors.

JOSHUA B. LIPPINCOTT is a native of Bur-

JOHN BROMLEY & SONS.
CARPET MANUFACTURERS

lington county, New Jersey, and his ancestors were members of the Society of Friends. He came to Philadelphia between the years 1827 and 1830, and, at a very early age, obtained a situation in a small book store. Not many years afterwards he commenced business on his own account, with the results as above detailed. He has ever manifested a deep interest in the welfare of his adopted city, and his business policy has always comprehended a strenuous endeavor to attract trade to Philadelphia, and to retain it. In the same spirit he has liberally invested his capital in whatever schemes promised to assist in the development of its resources and prosperity. He has been for many years director in some of the largest institutions, and takes a warm and active personal concern in their operations.

JOHN BROMLEY & SONS' CARPET MILLS, Nineteenth Ward, Philadelphia. The nucleus of the above extensive carpet manufactory was a single hand-loom worked by the founder in a rented room at Germantown road and Fifth street. This was in 1845, and the winter of that period was so severe that, in the language of the weaver, "he had to keep going a stove as large as his loom." From time to time he added to his stock of machinery, until, in 1860, he had thirty-seven hand-looms in operation. He now began to cast about for a more commodious building in which to carry on his daily increasing manufactures. This he found in a building erected for a dye house by John Hill, a man well known in the manufacturing circles of Philadelphia in years gone by, at the corner of York and Jasper streets. For this property he paid $10,000, and was to have ten years in which to discharge the debt. At the end of half that time not only was the last cent of the purchase-money paid down, but the owners (three sons had been admitted as partners at various times within the last ten years) had greatly improved the property and added to their stock of machinery. The stepping-stone to the great success of Mr. Bromley as a carpet manufacturer was the material aid given him by Bailey Bros., of Chestnut street, a firm now out of existence. For many years he manufactured almost exclusively for them, and they interested themselves so far as to advance him money to increase his stock of looms, and to recommend him to the favorable notice of other large carpet dealers. In this way he came into business contact with Orne Bros., who asked him if he could match their foreign colors in carpets. He readily responded in the affirmative, but it was with some reluctance that the firm gave him leave to make the experiment. He succeeded in pleasing them, however, and for many years they were his patrons. He always paid particular attention to the weaving of his goods, and made their strength and durability their special recommendation. Though often disheartened by dull times, and importuned to discontinue the business as a non-remunerative one, he persevered and overcame many obstacles in the early years of his manufacturing experience. After purchasing the property on York street he gradually added to it, until now it includes the triangular lot of ground fronting on Front, York, and Jasper streets. In 1868, his elder sons withdrew from the firm, formed a partnership as Bromley Bros., and erected a carpet manufactory opposite that of their father. They were succeeded by younger brothers, and the firm is now composed of John Bromley and his sons John H. and Joseph H. Bromley. Another son, who is now being educated, will be admitted as soon as his studies are completed. Since 1860, the number of looms has been almost quadrupled, while the manufactures, from the fact that power-looms are now playing an important part in carpet weaving, have more than quadrupled. The manufactory has never lain entirely idle during any of the financial crises of the past thirty years, which fact is due as much to the economical management of the head of the firm as to the quality of the goods manufactured. The manufactures consist of the stoutest ingrain and finest Venetian carpetings. Employment is given to over 200 hands, at least one-fourth of whom are women. One hundred hand and thirty-two power-looms turn out annually goods valued at $400,000.

JOHN BROMLEY is a native of the village of Hanging Heaton, distant about seven miles from Leeds, England; and so termed from the circumstance of the houses being erected on the hill side, and the buildings thus literally overhanging the valley. He was born there April 25th, 1800, and is the son of John Bromley, a woollen manufacturer, whose family for many generations back had been engaged in the same calling. John Bromley, the elder, sold the goods he manufactured at the Leeds Cloth Hall; they embraced, among various articles, blankets, army goods, and particularly the gray top-coats of the soldiers. He gave the ordinary school education of the day to his son, who also availed himself of the instructions of his brother, who was possessed of attainments of a high order, and was a very successful teacher. He was educated to the business so long followed by the family,

and who were all noted for the excellence of their productions. Remaining with his father until he had reached his twenty-eighth year, he then commenced business on his own account in his native village. He had the usual obstacles to encounter, but being possessed of indomitable energy, overcame them; and although several times on the verge of failing, succeeded in escaping that fate, and triumphed at last. He found a market for his manufactures in the north of England, and in Scotland. He had for some time only operated his works by hand; but a new factory was established to be propelled by steam power, and he was invited to become a partner. After consulting with his father, who looked favorably upon the undertaking, he embarked his capital in the establishment. It was a joint stock concern, there being twenty-four persons participating therein, and traded under the style of Hirst, Mayman & Co. The elder John Bromley was one of the managers, there being a committee appointed by the shareholders to superintend affairs, which served for three months. The wool was carded and pulled by steam power, and then taken home, the remainder of the work being done by hand power, each partner having his share of the work to be so performed. The works were situated at Batley Carr, near Dewsbury, and about a mile from Hanging Heaton. In the course of time the business languished, and the financial panic of 1837 brought matters to a close. After a period of inactivity, John Bromley resolved to try his fortunes in the New World, and with his wife and family embarked from Liverpool in the "Shenandoah," one of Cope's line of packet ships, and after being fifty-seven days afloat, landed in Philadelphia, March 11th, 1841. He had brought a small amount of money with him, with which he embarked in the business of spinning carpet filling, locating himself at Little Falls, near Patterson, New Jersey; he had associated himself with another, but the business did not prove lucrative, and becoming dissatisfied, he returned to Philadelphia in 1845. In the old District of Kensington he settled down as a carpet weaver, and by diligently laboring, and persevering through many difficulties, which he surmounted one by one, he found success gradually dawn upon him. He has been married twice. His first wife was Susannah, daughter of Joseph Day, to whom he was married in 1827, and who died in New Jersey. His second wife, to whom he was joined in 1843, was Lucinda Jane, daughter of Jacob Smalley, of Little Falls, New Jersey. He is in the fullest sense of the term a self-made man, and a foremost representative of the best class of Pennsylvania's manufacturers.

JOHN T. BAILEY & CO., Manufacturers of Bags, Rope, and Twine, Philadelphia. In 1859, John T. Bailey associated with him James Cascaden, under the above style, and commenced the manufacture of cotton, jute, and linen bags on a very small scale, the locality being on Arch street west of Front; and aided by some of their friends their success was assured, the amount of their business the first year reaching $50,000. In 1860, the concern was removed to a large building on Front street above Arch, where they improved their business to a great extent, and here they remained some four years, doing a business which averaged $300,000 per annum. In 1864, the firm again removed their establishment, and became the occupants of a large and extensive building on the northeast corner of Market and Water streets, where they remained until 1874, when they removed to No. 120 Chestnut street, opposite Letitia. In 1868, James Cascaden died, and, in 1869, the senior partner associated with him his brother, Christopher Bailey, and Frank Cascaden, a younger brother of the deceased member, the style of the firm remaining unchanged. The following year they erected an extensive two-storied factory—to which has since been added an additional story—at Front and Tasker streets, where they manufacture ropes and twines to a very large extent, the latter being their specialty. They are the only manufacturers of hemp ropes and twines by machinery in the United States. Christopher Bailey introduced this branch of the business, and a force of over 100 are engaged in it under his management. The bag manufactory is at the store building on Chestnut street, where a force of 130 are constantly engaged. The yearly amount of their business is over $700,000. They are the sole manufacturers of the "Philadelphia Cotton Seamless Bag," and the value of these annually produced is over $150,000, and constantly increasing. Their stock is a heavy one, and as an evidence of this it may be stated that the firm, in a single period of three months, have loaned to the Philadelphia shippers of grain over 300,000 three-bushel bags. This firm are the originators of the "Rope Fire Escape," which is most effective in its operations, and ought to be appreciated by the public: the largest is capable of carrying twenty persons from the top of the highest building to the ground in perfect safety.

JOHN T. BAILEY was born, in 1830, near the city of Dublin, Ireland, where also he was educated. He emigrated to the United States in 1850, and on his arrival in Philadelphia was entirely

John Bromley

without means. He was first employed in the house of B. S. Janney, Jr., & Co., wholesale grocers, where he remained five years, and afterwards was with Field & Keehmlie, merchandise brokers, for a like period, when, having accumulated enough funds from his savings, he started in business on his own account.

CHRISTOPHER BAILEY was born, in 1833, near the city of Dublin, Ireland. Having received a good business education, he engaged to learn the business of rope and twine manufacturing, and followed it for twenty-two years in the city of Dublin. Coming to this country in 1969, he immediately entered into a partnership with his brother in the manufacture of bags, and hemp rope and twines by machinery. His thorough knowledge of the latter department of the business has given the firm great prominence throughout the country.

THE DELAWARE RIVER IRON SHIP-BUILDING AND ENGINE WORKS, located at Chester, were founded by Thomas Reany in 1860, and having associated with him his son, William B. Reany, he put them into operation under the name of the Pennsylvania Iron Works. In November, 1860, Samuel Archbold, Engineer-in-chief United States Navy, became a member of the firm, which then assumed the style of Reany, Son & Archbold. This partnership having expired by limitation at the end of ten years, a joint stock company was formed, under the name of the Reany Engineering and Shipbuilding Works, which was continued until the purchase of the works by John Roach, President of the present company, in 1871. Under the old régime the works employed some 900 men, who were engaged in the construction of ships, locomotives, marine and stationary engines, forgings, iron and brass castings, machinists' and boiler-makers' tools, etc. The operations consumed some 2500 tons of coal and 3000 tons of iron per annum. The works occupy an area of about thirty-two acres, with a river frontage of 1200 feet, with sufficient water off the piers to float the largest vessels. The buildings include a handsome three-story structure 44 by 43 feet, occupied as offices, draughting rooms, etc.; foundry 100 by 111 feet; blacksmith shops 66 by 163 feet; boiler shops 137 by 140 feet; machine shops 143 by 63 feet and 98 by 63 feet; ship-yard sheds 101 by 211 feet, with blacksmith shop adjoining 37 by 68 feet; angle iron furnace shed 163 by 62 feet; copper shop 80 by 21 feet; sand shed 22 by 89 feet; pattern house 84 by 47 feet, with small extension; carpenter shop 42 by 32 feet, with grinding shop beneath; beam shop 75 by 48 feet; mould lofts 50 by 160 feet and 33 by 126 feet; paint shop 24 by 16 feet; joiners' shop 31 by 335 feet, with wing 94 by 43 feet, and all the conveniences promotive of successful operation. At these works have been constructed the monitors "Sangamon," "Lehigh" and "Tunxis;" the gunboat "Tahoma;" the double-enders "Paul Jones," "Waterce," "Suwanee" and "Shamokin," all known for the efficient service rendered during the War of the Rebellion. Beside these they have built a large number of merchant vessels, varying from the smallest tug to the largest vessel ever built in the United States. The manufacture of immense quantities of machinery and extensive repairs have also been effected, and among the latter may be noted the refitting of the iron-clad monitors "Wyandotte," "Passaic," "Nahant," and "Jason," consigned to their care during the "Virginius" troubles of 1873. During latter years the works have been operated especially for the building and fitting out of large iron ships, of which some twenty, including those under way January 1st, 1874, have been constructed by the present company. These include two iron sloops of war for the United States Navy, each 175 feet long, 32 feet beam, and 15 feet deep, with a propelling force of 560 indicated horse power; two steam colliers for the Philadelphia & Reading Railroad Company, one 220 feet long, 37 feet beam, 19 feet deep, and measuring about 1200 tons, and the other 197 feet long, 20½ feet beam, 16 feet deep, with a capacity of about 600 tons; four iron vessels, each 258 feet long, 36 feet beam, and 22 feet deep, with capacity of about 1500 tons, and adequate propelling force; one having been built for C. H. Mallory & Co., of the Texas Line, New York to Galveston; one for the Old Dominion Steamship Company, New York to Norfolk; and the others for the Pacific Mail Steamship Company. For the latter company there were completed, in 1874, the "City of Peking" and "City of Taikio," the largest in the world except the "Great Eastern," each being 423 feet long, 48 feet beam, 38½ feet deep, with a carrying capacity of nearly 6000 tons. Each is propelled by a compound marine engine, with cylinders respectively 51 and 88 inches in diameter and 54 inch stroke, supplied by 10 boilers, each 13 feet in diameter and 10½ feet long. The "City of Peking" was launched March 18th, 1874, in the presence of hundreds of distinguished guests from all parts of the country and thousands of interested spectators. The works consume annually about 16,000,000 pounds of iron, and give employment to

some 1500 hands, with an average weekly pay roll of $20,000, and for whose accommodation there have been erected fifty comfortable dwellings. Among the employés are draughtsmen, model makers, pattern makers, machinists, boiler makers, blacksmiths, iron founders, brass founders, brass finishers, coppersmiths, plumbers, carpenters, spar makers, caulkers, joiners, painters, varnishers, polishers, riggers, sail makers, and a large force of laborers. Some of the operatives are artisans of large experience, while many have been taken from other walks in life and initiated into the mysteries of mechanics in this establishment. An admirable system pervades the works, each department being under the supervision of a skilled mechanic, from whom detailed daily reports are required, and these being condensed into one, the President, present or absent, is in daily receipt of the minutest details of all the work in progress.

HENRY CLAY FURNACES, Eckert & Brother, Proprietors, Reading, Berks county. In 1842–'44, one of the largest anthracite furnaces that, until that period, had ever been projected in Pennsylvania, was erected at Reading by Isaac and his brother Dr. George N. Eckert, and operated under their joint proprietorship. It was most appropriately named by them in honor of the father of protection to home manufactures, and the Whig candidate for the Presidency in the latter year, the "Henry Clay Furnace." In 1855, another furnace of like extent was added to this upon an adjoining site. On the decease of Dr. Eckert, his brother purchased his interest in these iron works, and thus became sole proprietor, and continued to operate them until July 1st, 1873, when he relinquished his active interest in them to his two sons, Henry S. and George B., by whom they are now carried on, under the firm-name of Eckert & Brother. Since the furnaces were first erected they have been considerably enlarged. The height of the stacks is 38 feet, and the diameter of the bosh 14 feet. The ores used are hematite and magnetic, and are procured from mines and ore banks, of which they have acquired possession both by lease and purchase, believing this the most judicious course they could adopt, and which renders them independent of any outside party. It was not three months after the new firm took possession of these furnaces that the financial troubles of the country culminated (in September, 1873), but it did not affect the operations of the firm in any degree whatever; they have since continued as though no panic had taken place. They neither reduced their force of operatives nor diminished in any degree the amount usually produced at the works, but continued to turn out 250 tons of pig-iron per week, as heretofore. About 250 men are employed at the furnaces and in the mines and ore banks.

ISAAC ECKERT, the founder of these furnaces, was born, January, 1800, in the village of Womelsdorf, Berks county, Pennsylvania, and was a son of Peter Eckert, a farmer and merchant of prominence in that section. He received his elementary education in the schools of his birth-place, and completed his studies in the grammar school of the University of Pennsylvania. Before he had attained his majority, he, in co-partnership with his elder brother William, succeeded to the mercantile business of their father, and, in 1828, the brothers removed to Reading, and continued in the same occupation until 1836, when he retired from that connection, and became associated with his younger brother, Dr. George N. Eckert—a gentleman of extensive scientific acquirements, whose attention was early directed to the development of the rich mineral resources of Schuylkill county, and who, for a series of years, ably represented that district in the Congress of the United States—and devoted his time and means to the manufacture of iron. In 1838, he was elected President of the Farmers' Bank of Reading, a State institution, since reorganized under the national bank system, with the title of the Farmers' National Bank, which office he held, without intermission, until his death, covering a period of thirty-five years. His eldest son, Henry S., has succeeded him in that position. He was also President of the Country Bank Association—composed of the national banks east of the mountains—for eight years. In 1852, he was chosen President of the Leesport Iron Company, in which he was one of the principal stockholders, and of which he continued to act as the executive officer up to the time of his decease. He was a very considerable land owner in Berks and Schuylkill counties, and his investments were uniformly safe and remunerative. He was one of the founders of the Berks County Agricultural and Horticultural Society, and for many years its President. He was selected by President Grant as one of the Commissioners to the Vienna Exposition of 1873, and was appointed, by Act of the Forty-second Congress, one of the two Commissioners from his district for the organization of the Board of Finance, under which the Centennial Exposition for 1876 was undertaken. He was a delegate to the National

Convention at Chicago, in 1860, when Abraham Lincoln was nominated to the Presidency for his first term, and was one of the Presidential electors for Pennsylvania in 1864. He died December 13th, 1873.

HENRY S. ECKERT was born in Reading, Pennsylvania, in 1839. He received a liberal education, and graduated at Marshall College, Mercersburg, Pennsylvania. As it was his father's intention that he should, at some future period, succeed him as the operator and one of the proprietors of the iron works he then controlled, he immediately entered the establishment in order to obtain full acquaintance with the various manipulations and processes therein effected; and he shortly became the active and able manager of the same, and remained in this position until the present firm was formed. Previous to this time, however, he had also been engaged in a separate enterprise, as a member of the firm of Eckert, McHose & Co., in the rolling mill business. He has always taken a lively interest in political matters, especially as the principles of protection to the iron and coal interests of the State are due, in a great measure, to a rightful application of such doctrines by the party which has always advocated them. During the war, and towards its close, he was the Republican candidate for Congress, but the district being intensely Democratic he failed to be returned, although he carried Reading. He is prominent in all matters affecting the welfare of the general public, more especially on financial topics, of which he has made a long and profound study. In the Berks County Railroad he has been very prominent, and has served as one of the directors of that company since it was first projected. He was for some years a director of the Farmers' National Bank, of Reading, and, since his father's death, has been chosen to succeed him as President.

GEORGE BROWN ECKERT was born in the city of Reading, Pennsylvania, September 13th, 1840. He received a liberal education at the academy in Danbury, Connecticut, and, at the close of his studies in this institution, entered the counting-house of his father at the furnaces in Reading, and also learned the business of iron manufacturing. At the outbreak of the late civil war, he volunteered his services, and was in the first regiment from Pennsylvania (and the North) that passed through Baltimore to the seat of war. At the close of the "three months' service," for which he had volunteered, he received a commission as Lieutenant in the Regular service, 3d Infantry, and served throughout until the close of the war, being regularly promoted to the rank of First Lieutenant and Captain, though he resigned before receiving the latter commission. He was present and participated in the several battles of Yorktown, Gaines' Mill, Seven Pines, Malvern Hill and the whole of the "seven days fight," beside numerous skirmishes. He was also at the battle of Fredericksburg and the second battle of Bull Run, being attached to the Fifth Army Corps, General Sykes. He manifested great bravery and gallantry, and can point with pride to the record he has made. At the close of the war he returned to Reading, where he gave his entire attention to the business of iron manufacturing at his father's establishment, with his brother, H. S. Eckert. He is a large stockholder in the Farmers' National Bank, of Reading, and one of the directors of the Reading Fire Insurance Company. He is a devoted and earnest member of the Episcopal Church. He was married, in 1866, to Mary A., daughter of Horatio Trexler, of Reading.

LUCY FURNACE, Kloman & Carnegie Brothers, Proprietors, Pittsburgh. This Furnace was built by E. J. Bird and William Tate, and went into blast in May, 1872. It is located on the bank of the Allegheny river, about four and a-half miles from the centre of the city. Switches connect the stock house and cast house with the Allegheny Valley Railroad, affording easy communication with the Pittsburgh market and with the termini of the various lines of transportation by which the ores and fuel are received. The stack is 75 feet high by 20 feet diameter of bosh. Like most Western furnaces, it is an iron cylinder lined with fire-brick, with an independent iron gas flue, around which winds an iron stairway, affording access to the top of the furnace. The fuel and ores are carried to the tunnel head in barrows, by means of a pneumatic lift, and dumped by hand. The machinery is of the best quality, though of a very different character from that usually seen east of the mountains. There are three excellent blowing engines and four pumping engines, the latter to raise from the Allegheny river the water needed about the furnace. There is a locomotive also used in and about the works. Steam is raised by a battery of eight boilers, each 60 feet long and 43 inches in diameter. The capacity is about 550 tons per week, taking the average of the seasons. The ores used are mostly Lake Superior, specular

and hematite. During 1874, there were received about 25,000 tons from the Kloman Mine, the property of the company and covering 500 acres of land, near Negaunee, Michigan. The fuel is a coke made from the slack of the bituminous mines, near Pittsburgh, and costs but $3.60 per ton at the furnace. The consumption of coke averages 1½ tons to the ton of pig-iron made. Among the novelties to be seen here is a very simple and practical machine for cooling slag, the invention of Andrew Kloman, one of the proprietors. It consists of an annular water trough, with supply and waste pipes, in which, by suitable appliances, a series of cinder boxes are made to rotate, so that they may be brought successively under the slag spout. Around, under and between the boxes water flows constantly, and in a short time the slag is sufficiently cooled to be handled and removed. The proprietors consider it the cheapest and best mode of disposing of the cinder they have ever tried. An experiment is shortly to be tried here which is novel, at least in this country. It is proposed to use two tiers of tuyeres, one 18 inches above the other—7 below and 5 above. There is a theory that, by elevating the zone of fusion, a larger product and superior material would result. The firm embraces Andrew Kloman, Andrew and T. M. Carnegie and Henry Phipps, Jr. These gentlemen also own two rolling mills in the city for the manufacture of bridge and shaped irons. At one of these mills they make all the iron work for the Keystone Bridge Company, and the product of the Lucy Furnace is supplied directly to these works. The company intend to increase the number of their stacks, as the state of the iron trade shall warrant.

UNION IRON WORKS, Carnegie, Kloman & Co., Proprietors, Pittsburgh. In 1860, Andrew Kloman and Henry Phipps, Jr., commenced, in a small shop at the corner of Ninth and Railroad streets, the manufacture of bar-iron and railroad axles. They had but a limited capital and could employ only a few workmen; but by industry, intelligence and well-directed skill on the part of the managers, the unpretending shop, in comparatively few years, has grown to the extensive factory of imposing proportions, and its products, for excellence of design and construction, have won a standard reputation among interested parties throughout the country. In 1865, the business of Kloman & Phipps was incorporated with that of the Cyclops Works, under the control of Andrew Carnegie and Thomas Miller, the entire concern now being termed the Union Iron Works. Under the management then inaugurated the business was conducted with ever-increasing prosperity until January, 1871. At this period another change was made in the organization of the controlling powers, which resulted in the formation of the co-partnership now existing under the firm-name of Carnegie, Kloman & Co. Originally, four puddling furnaces answered all their demands; to-day, thirty are necessary to work up the products of the Lucy Furnace. These appliances enable them to run from 525 to 550 tons of mill metal per week, in the production of which, as connected with the works only, about 1300 employés are engaged. The works, proper, cover an area of from eighteen to twenty acres, and are situated within the limits of the city of Pittsburgh. They manufacture heavy iron for bridges, rolled beams, girders, etc., to all of which they devote their special attention, and to such perfection have they attained in these productions that, even with their seemingly unlimited capacity, the supply is at times unequal to the demand; and recently they have been forced to enlarge their buildings, beside making extensive additions and improvements in gas furnaces, steam cranes, etc., in order to meet the wants of the Keystone Bridge Company, which is one of their principal patrons.

HENRY TROEMNER'S SONS, Manufacturers of Scales and Weights, Philadelphia. The father of the present proprietors commenced the business in 1838, with a cash capital of $500, the savings of years, and at first occupied the basement of the building No. 240 Market street. He employed three men, and during the first year produced goods to the value of about $5000. He, however, encountered many drawbacks, and his hard-earned savings were more than once in danger; he was even on the point of discontinuing his occupation, when he received a most cheering and encouraging letter from a large mercantile house in New York, which urged him to continue his special line of manufacture. He profited by the advice thus given; and, being naturally of a persevering nature, surmounted the obstacles which had beset him and ultimately built up the business to its present standing—it being the largest manufactory for these specialties in the United States. About this time he received a contract to make the scales for the United States Mint, at Philadelphia, and performed his work so satisfactorily that the suc-

cessive heads of the Treasury Department ever after intrusted its most careful work to his manufacturing skill. It may also be mentioned, in this connection, that his establishment has for years furnished the official standard of scales, weights and measures for the United States and for its State and city governments. The factory building is now situated at the corner of Twenty-second and Master streets, and gives steady employment to about sixty-five hands. The amount of capital invested is over $35,000, and last year (1874) produced scales and weights of the cash value of $165,000. In April, 1873, Henry Troemner died, since which period the business has been conducted by his three sons, John L., Frederick W. and Edward Troemner, who fully sustain the high reputation their father gained as being one of the most reliable and successful makers of scales in the country. This success was attained by his great knowledge in all the details and requirements of the business; and he paid special attention to the careful manufacture of counter-scales for druggists and grocers, more particularly the former, who insist on perfect accuracy in their weights and balances.

HENRY TROEMNER was born, 1809, in the Electorate of Hesse-Cassel, Germany, of humble parentage. His only education was obtained in his native place; but he did not remain long at school, for it was necessary that he should labor for his daily bread. Having chosen his vocation, he served an apprenticeship of eight years and became thoroughly conversant with the same. He emigrated to the United States in 1836, and, after laboring for two years as a journeyman, accumulated a small amount of capital, with which he commenced business on his own account. He was of a most persevering character and of the strictest integrity, and he attributed his great success in his line of business to his temperate habits, resulting in his leading a steady, quiet and industrious life. He was a prominent member of the Masonic order.

JOHN L. TROEMNER, eldest son of Henry Troemner, was born in 1840. He was educated with the special view to his taking charge of the manufacturing department of his father's business, and is a skilful mechanic. His specialty is the manufacture of what are known as "fine scales of precision," for scientific purposes. He has charge of and superintends the manufactory.

FREDERICK W. TROEMNER, second son, was born in 1843, in Philadelphia. He received a sound business education, and then learned the trade of his father, under his personal supervision. In 1861, he entered the salesroom of the manufactory, and ten years later became a partner. He now has charge of the store, at No. 710 Market street.

EDWARD TROEMNER, the third member of the firm, is much younger than his brothers, and is not a practical mechanic. He assists his brother, Frederick, in the mercantile department.

ONONDAGA IRON WORKS, Samuel Kimberly and others, Lessees, New Castle, Lawrence county. This is quite an extensive establishment and is located on a tract of land containing eighteen acres, situated between the Shenango and Neshannock rivers, New Castle, Pennsylvania. The works were commenced in 1838, by James D. White, under the name of the New Castle Iron Works, to manufacture blooms into nails and bar-iron. At that time the machinery consisted of six nail machines and two trains of rolls; and 15,000 kegs of nails, together with 500 tons of merchant bar-iron, were manufactured annually. The works were then run by water power, and employed eighteen men. In February, 1841, A. L. and J. M. Crawford and G. W. Reitter, all of Montgomery county, purchased the concern and changed the name to the Cossalo Iron Works. In the following year Mr. Reitter retired, when the firm became Crawford Brothers, who proceeded to enlarge the works, adding eight puddling furnaces, a large steam engine and a trip hammer. In 1845, the firm discontinued making rails on the old plan, and introduced the present system of grooved rolls, which, by the way, was the first attempt of the kind in the United States. This plan was shortly afterwards adopted by other manufacturers, and has since become general. In the same year they commenced rolling all small iron, from $\frac{5}{8}$ down to $\frac{3}{8}$, from narrow piles instead of billets. In 1847, twenty-five nail machines were added, and the works then remained unchanged until 1853, when twelve additional puddling and three heating furnaces were erected. The nail mill machinery was disposed of to the Sharon Iron Company, which was then going into operation, and the Cossalo Works were changed to a rail mill. It continued as such until 1854, when, owing to the low price of rails in the market, it was changed back to a bar-iron and nail mill, and was operated by the Crawford Brothers until 1864, when the establishment

was purchased by the firm of Edward Dithridge & Co., of Pittsburgh, by whom they were named the Lawrence Iron Works. These gentlemen continued in possession of the property, which was being constantly operated by them, until 1871, when De Graff and others, of New York, became the owners by purchase, and these changed the style to the Onondaga Iron Works, which is the present appellation. Since the last named date these works have been leased and operated by Samuel Kimberly and others, and are now (1875) successfully running. From time to time various buildings have been added to the original works, until at present they are very extensive. Among the many appliances for the manufacture of merchant bar, muck bar and nails, may be named 17 puddling and 4 heating furnaces; one bar mill; one muck mill; one guide mill, and 33 nail machines, which are run by 5 steam engines. The works have a capacity of producing 1800 kegs of nails weekly, and a total manufacture of 10,000 tons of iron per annum. Two hundred and fifty men are constantly employed.

A. L. CRAWFORD, Coal and Iron Operator and Railroad Promoter, was born, February 5th, 1815, near Norristown, Montgomery county, Pennsylvania, of American parentage. One of his great grandfathers emigrated to this country in 1742. His father was extensively engaged in the lime business near Norristown, and also followed the vocation of a farmer, and was materially assisted in both pursuits by the son, who in the interim obtained a good education in the schools of that section. He continued in the lime business until he was twenty-six years of age, when he removed to New Castle, and, in connection with his brother, J. M. Crawford, and G. W. Reitter, both of them his neighbors in Montgomery county, purchased the New Castle Iron Works, to which they gave the name of Cossalo (now the Onondaga) Iron Works, and with which he was connected until 1864. During this period, however, he was extensively engaged in the iron and coal business in different parts of the country. The first shipment of iron ore ever sent from Marquette, Michigan, was made by him, being a small lot of five tons, which was forwarded to his works at New Castle as an experiment. At that date the "town of Marquette" had not arrived to the dignity of one house. He was one of the pioneers in the coal business at Brazil, Indiana, where he is at present a heavy operator. He is also at this date largely engaged in iron mining in Missouri, and in the furnace and iron mill business in Terre Haute, Indiana. He has also been for many years, and is yet, prominently identified with various other mining, manufacturing, banking and railroad corporations and enterprises in different parts of the country. In 1862, he built the New Castle & Beaver Valley Railroad, of which he is President. In 1866, he assisted in the construction of the Lawrence Railroad, extending from New Castle to Youngstown, Ohio, and is a director in the same; also one of the builders of the Ashtabula, Youngstown & Pittsburgh Railroad, in which corporation he was a director, and is now a large stockholder. In 1872, in conjunction with Colonel Thomas A. Scott, of Philadelphia, J. N. McCullough, of Pittsburgh, W. L. Scott, of Erie, John F. Tracy, of Chicago, and others, he built the St. Louis, Salem & Little Rock Railroad, in Missouri, and is President of that company. This road is forty-one miles long, and extends from the town of Cuba, on the Atlantic & Pacific Railroad, to Simmons' Iron Mountain, near Salem, Dent county, Missouri, and was chiefly built for the transportation of iron ore from the counties of Crawford and Dent, where the company own extensive mines and have probably the best facilities in the country for the manufacture of charcoal iron. He is also a director of the National Bank of Lawrence County, and the President of the New Castle & Franklin Railroad Company, which line is now approaching completion; is thirty-six miles in length and extends from New Castle to Stoneboro', on the Jamestown and Franklin branch of the Lake Shore & Michigan Southern Railroad.

EAGLE WORKS, William O. Hickok, Proprietor, Harrisburg. About the year 1848, the proprietor of these works began to construct machinery for book-binders, and gradually became engaged in the machinery business. He always had a taste for mechanics, and, being possessed of an inventive faculty, believed this to be his true and proper sphere. Having a small amount of capital at his command, the accumulation of years of toil and self-denial, he started his shop in a single room of no very large dimensions, and confined his attention to the manufacture of ruling machines and minor articles, and, as time passed and success was achieved, gradually increased the variety of his productions. He had, however, one reverse; but, happily surmounting this obstacle, has wonderfully

progressed. The Eagle Works are comprised in a series of buildings occupying considerably more than half the square lying between Canal, State and North streets and Poplar lane—being about two acres of ground. The main structure fronts on Canal street and is an imposing edifice of frame and brick, the former of four stories and the latter of four and three stories in height. There are also on the premises a large brick foundry, with two cupolas, whose joint capacity is twenty tons per heat; a drying house, smith shop and various other smaller structures, which, of necessity, are included in an extensive manufacturing establishment. Although the works have all the appliances for making any and every kind of machinery, the business of the establishment is chiefly confined to the manufacture of certain specialties in book-binders' machinery, and cider and grape mills, which the proprietor controls as patentee. It is doubtful if any article of American manufacture has a wider reputation and sale than the "Pennsylvania Ruling Machine." They have been sold and shipped to every civilized and semi-civilized country in the world. They are equally used by Turks, Egyptians, East Indians, Malays, Chinese and Japanese, as well as by the highly civilized and polite subjects of various European kingdoms and empires. In short, in whatever clime the art of printing has penetrated, followed by its hand-maid, book-binding, there will be found a ruling machine bearing the trade-mark of the Harrisburg Eagle Works. Seven different varieties of ruling machines are manufactured, comprising "Pennsylvania," new and old style; "Harrisburg," new and old style; the "New York," the "Boston" and the "Double Ruling Machine;" the latter, which rules both sides of the paper at once, has become very popular in Europe. In this connection it may be stated that, while these machines bear different names, they are all the production of the inventive mind of the proprietor of these works. The same general principles are preserved in each, yet there are a number, and, in some instances, material points of difference in their construction and attachments—the result of improvements made at various times by the proprietor during the thirty years the machines have been before the public. Perhaps the most important of these latter are the patent strikers for down-ruling, which rule from one to four heads with remarkable rapidity, and in a very superior manner. Among the other specialties of book-binders' machinery fabricated at the Eagle Works are improved sawing machines, embossing or seal presses, improved grinding machines, blank-book sewing benches for tape, parchment or printed work, improved stabbing machines, gauge-table shears, backing machines, finishing presses, cutting boards, finishers' stands, gold-cushions, pressing boards, gilding-presses, plow and presses, forming-irons, beating-hammers, patent hand-stamps for lettering indexes and paging books, standing presses, etc. Patent ruling inks, scarlet, blue, yellow, green and violet, the invention of the proprietor, are also manufactured and disposed of in large quantities. In short, there is no tool, implement or other requisite of a first-class book bindery that may not be found at these works; and so favorable and wide-spread is their reputation for superior excellence that, like the ruling machine, they find a market in every quarter of the globe. Another important specialty of manufacture is the "Hickok Patent Portable Keystone Wine and Cider Mill." This is the pioneer of portable mills for grinding or pressing fruit, and still preserves the renown that distinguished its first reception by the public, over twenty years ago; and this is remarkable from the fact that very little improvement has been made in its machinery, so perfect was the apparatus from its first inception. It can make from six to twelve barrels of cider per diem; can be worked by hand, horse or steam power; and when the apples are ground, a boy can press the pomace with ease. In the vineyards of the West and North it is the standard wine-mill, having proved itself very superior for grinding the grapes, just cutting the skin without breaking up the core. Farmers find in it an admirable and efficient machine for pressing currants, cherries, berries, cheese, butter, lard and tallow. Over 100 silver medals and diplomas of honor have been awarded to the inventor, from exhibitions in various parts of the country, within the past few years. Among other advantages, it may be stated that it will grind the easiest and in the most rapid and perfect manner; the press is the most simple, powerful and quickest handled; it is not hampered with numerous screws and cog wheels, and occupies but a small space, is well made and sold at a fair price. There are various other specialties manufactured at these works; but enough have been named to give an idea of the importance and magnitude of this great industrial establishment. No one can visit the works without being impressed with the admirable arrangement of machinery and appliances, and with the perfect system and regularity with which each of the several departments is conducted. In addition to what the proprietor manufactures, he buys and sells a large quantity of the goods made by others, and keeps a general stock of steam and gas

fittings and small tools, filling an extensive ware-room with such goods.

WILLIAM ORVILLE HICKOK was born, October 6th, 1815, in Western, Genesee county, New York, his father being a New Englander by birth. After receiving a fair education, he left the academy at the age of fourteen, and went to Lewistown, Pennsylvania, where he was employed in a country store for four years. He next learned the book-binding trade, in the same town, and served an apprenticeship of three years. In 1836, he removed to Chambersburg, and was engaged with his father in the manufacture of blank books, beside doing some publishing. Three years later he proceeded to Harrisburg, where he associated himself with Mr. Cantine, the firm being Hickok & Cantine, publishers and blank book manufacturers, and conducted this business until he established his workshop, and subsequently his present extensive factory. He has served as a member of the City Councils for seven years most acceptably, and for six years has been President of the same.

CLINTON AND MILLVALE ROLLING MILLS, Graff, Bennett & Co., Proprietors, Pittsburgh. The Clinton Mill is located on the Monongahela river, while the Millvale is located in upper Allegheny. The latter was erected, in 1845, by Cully, Jones & Co., from whom it was purchased, in 1853, by Bennett, Marshall & Co., the predecessors in business of the present firm. In both these mills are manufactured iron rods, sheet, plate and nails. In 1873, it was found necessary to erect extensive buildings, so as to enlarge the Millvale mill to meet the requirements of the manufacture of iron plates of the largest size. In this extension are introduced five of Dark's Rotary Puddling Furnaces, for puddling large quantities of iron by machinery. Each furnace has its separate steam engine. These furnaces cost over $5000 each, and are capable of puddling charges of 1000 pounds; and there are provided shears of extra power for cutting the heavy bars, and ponderous hammers for action on the blooms. A "Universal Mill," or series of rolls, is also in use, so arranged as to engage all sides of the mass of iron submitted to them; and this is provided with Napier's reversible gear, by which all handling of the mass of iron thus treated is avoided. The feature of this establishment is the "Lauth Three High" mill for plates. The housings of this train are of immense size and weight; the rolls being 95 inches long and 28 inches in diameter; being, with one exception, the largest chilled rolls cast in the United States. The steam engine is of like colossal proportions, its fly wheel being 30 feet in diameter. With the new extension, the Millvale Works now present an unbroken floor line of 800 feet in length. The whole of the work was done under the supervision of Mr. Williams, the manager. The works have been running successfully since 1873, and some idea of the magnitude of the iron worked may be formed from the size of the muck bar rolled, which is twelve inches wide and two inches thick, while in ordinary mills the size is but four inches wide and half an inch thick. The amount of iron produced yearly averages 25,000 tons.

JAMES I. BENNETT was born in Crawford county, Pennsylvania, in 1822, and when he was but two years of age his parents removed to Franklin, Venango county. His ancestors were among the first settlers of western Pennsylvania, and of the old Presbyterian stock. When in his fifteenth year he was employed as a clerk in the store of Robert Lambertson, in Franklin, and afterward filled a similar position with the late Myron Park. In 1841, through Hon. John Howe, he obtained a situation in the grocery store of Myers & Richey, of Pittsburgh, remaining there for nearly three years. In 1844, he entered into partnership as a member of the firm of English, Gallagher & Co., in a wholesale and retail grocery business. The great fire of April 10th, 1845, entirely destroyed the stock in trade of that establishment, and the firm was subsequently dissolved. In the fall of 1845, with his partner, William B. English, he started for the seaboard to purchase a fresh supply of goods entirely on credit, and thus the firm of English & Bennett, general grocers, was organized. In this business he continued until 1854, when, with other capitalists, he leased the Clinton Rolling Mill, and the firm of Bennett, Marshall & Co. was established. Subsequently the firm of Graff, Bennett & Co. was formed for the manufacture of merchant bar-iron, nails, etc.; they were the first to erect a blast furnace in Pittsburgh. In conjunction with his partners, he afterward purchased the Millvale Rolling Mill, which was one of the earliest constructed mills in the county. He is interested also in the Isabella Furnaces, and is importantly connected with various other manufacturing and industrial interests in this section of the State. He is President of the Ewalt Bridge Company, and a prominent director in many other local institutions. He was Chairman of the committee recently elected

W. O. Hickok

by the creditors of the Allegheny Valley Railroad, and on that occasion evinced admirable judgment and ability. He was connected with the Superior Rail Mill Company, and was President of it for a time; he took an active part also in the construction of the Pittsburgh Locomotive Works, which have since proved an eminently successful enterprise, and in which he is still an influential director. His residence is near Superior Station, on the Pittsburgh, Fort Wayne & Chicago Railroad. He is a member of the First Methodist Church, in Fifth avenue, Pittsburgh, and has been connected with it since 1843.

ROBERT H. MARSHALL, one of the firm of Graff, Bennett & Co., was born, in 1814, in Stella, Durham county, England, and came with his parents to the United States in 1818, settling at Pittsburgh. He was here educated, and learned the trade of a blacksmith. When of age he commenced business on his own account; being first associated with Mr. Hawdon, and subsequently, in 1853, with Mr. Bennett, forming the firm of Marshall, Bennett & Co., which, at a later date, became merged in and took the present style of Graff, Bennett & Co.

ORMSBY FURNACE, Ormsby, Fish & Trimble, Sharpsville, Mercer county. The members composing the above firm are J. W. Ormsby, E. W. Ormsby, L. M. Ormsby, E. F. Fish, and James Trimble, who, in the month of May, 1872, commenced the erection of this furnace, which cost $105,000, with all the machinery and other appliances necessary for a complete outfit. It is situated on a tract of ten acres, in the borough of Sharpsville, on which also there are four tenement houses erected for the accommodation of operatives. The stack is 50 feet high, and the diameter of the bosh 12 feet. It was entirely completed and went into blast in February, 1873, and went out of blast in the same month of 1874. During this period, 13,358 tons of pig-iron were made, and the furnace has a capacity of 18,000 tons per annum. The ores used were chiefly from Lake Superior, and the average daily consumption of ore was forty-two tons; coal about sixty tons, and ten tons of limestone. Twenty-five men were employed by the firm, and the product of the furnace found a market in Pittsburgh. Since February, 1874, the furnace has been idle, although it remains in excellent order.

MAJOR J. W. ORMSBY (after whom these works were named) was born, July 15th, 1808, in the city of Pittsburgh, Pennsylvania, of American parentage. In 1811, his father, Matthew Ormsby, a native Pennsylvanian, removed to Mercer county, and settled near Greenville, where he followed the vocation of a farmer, and died in 1824. It was here that Major Ormsby received his education, working on the farm in summer, and walking three miles to school during the winter season. In 1830, his mother purchased a wool carding mill in Clarksville, of which he assumed the charge, and acted as manager for three years. When twenty-two years of age he married Jane, daughter of Esquire Campbell, of Clarksville, and soon afterwards removed to his farm near Sharpsville, which he cleared and improved, and upon which he continued to reside until the death of his wife, in August, 1873. At the date of his marriage—forty-five years ago—that section of country where he resided was but sparsely settled, and canals and railroads were unknown. He had opened a coal mine on his farm, and after supplying the local demand, was forced to haul his surplus by wagon and team to Conneaut Harbor, on Lake Erie. During the building of the Erie Canal extension, he had contracts to furnish beef for the operatives engaged in that work; and after its completion, enlarging his mining and transportation facilities, he became an extensive shipper to the lakes. When the Pittsburgh & Erie Railroad was opened he engaged more largely in the business, and built up a very considerable trade, "Ormsby coal" being a household word, and the mines famous throughout the country, both for the quality of the article, as well as the quantity produced. Being an extensive owner of collieries, not only in Pennsylvania, but also in Brazil, Clay county, Indiana (celebrated for its "block coal"), his aggregate products are 80,000 tons per annum, and 300 men are engaged in mining. In addition to the coal trade, he has, for many years past, done a large business in droving, grazing, and farming, the homestead comprising 750 acres of fine grazing land. He is a large shareholder in the Sharon Banking Company, and also in the Iron Banking Company of Sharpsville. His two sons—E. W. and L. M. Ormsby—are extensively engaged in the coal and iron trade, and he resides at present with his daughter, Mrs. Babcock. At the age of twenty-five he was elected Major of Militia, and holds his commission in that office from the late Governor Ritner. In appearance he is tall and commanding, with a mild, benevolent countenance, which serves as a clear index to his character. He has done much towards developing the resources of the valley and building up its business, and he enjoys, as he well deserves, the esteem and confidence of all.

BAZIN'S PERFUMERY AND TOILET SOAP LABORATORIES, Philadelphia. This establishment is the largest of the kind in the United States; certainly none other is so well known on this side of the Atlantic. It was founded by Xavier Bazin, in 1850. He came to this country, in 1842, to take charge of a well-known perfumery laboratory, on Prune street near Sixth. He was thoroughly competent for the undertaking, having served an apprenticeship to the business in France, and having been employed for a number of years by several of the leading perfumers of Paris; among others, the celebrated house of Piver. Up to this time the perfumery business was not very extensive, but with the advent of Mr. Bazin it began to extend and spread its influence throughout the United States. The best goods of this class had heretofore been imported, but the Prune street manufactory now began to compete with the foreign article. It was divided into two departments—one for the manufacture of perfumery and toilet soaps, and the other for a celebrated mineral water. The foreman was virtually at the head of the former department, and his employer had the fullest confidence in his ability as a manufacturer. It was a very primitive concern compared with its present proportions. Gradually the manufactures became more varied, and the skill and enterprise of the foreman had much to do with this. He occupied this position for eight years, when, with the savings of those years—$1500—he purchased the perfumery department of the business. It was then that the name of X. Bazin began to obtain celebrity as a perfumer, and, by extensive advertising, and the manufacture of first-quality goods, he built up a business in his special line second to none in the New World. The former proprietor had for years conducted a store in connection with his manufactory, and this was located on Chestnut street between Third and Fourth. Mr. Bazin refitted this establishment very handsomely; in fact, in a style that was considered very magnificent for those days. He also added to the variety of its stock, and made it the bazaar of his special manufactures. These improvements were not made without risk, for his capital was small. Full of confidence, however, he made bold to push his business in every direction. He foresaw the demand there would be for a home-made article of perfumery, as pure in quality and cheaper in price than that of foreign manufacture, and he made preparations to meet it. The sales for the first year were estimated at about $75,000, and the increase over this amount from year to year was such that he began to look about for a more convenient manufacturing location. This he found on Cherry street above Ninth, and, in 1855, he purchased the front building of his present extensive establishment. Three years previous, finding business creeping westward, he had moved his store to Seventh and Chestnut streets. He found several rivals in the field thereabouts, but he opened a battery of fair and honorable competition upon them, and succeeded in obtaining a strong foothold. He gave a banquet, to which were invited the gentlemen of the Philadelphia press, and the incidents of the occasion were duly chronicled in the journals of the day. In 1862, he built an addition to his manufactory on Cherry street. It has now a frontage of 63 and a depth of 108 feet, and is four stories high. Having been stocked with the most improved machinery, it is now a model establishment of its kind. The two buildings cost $50,000. A skilled chemist, their proprietor was continually experimenting and making discoveries in perfumes, new ingredients for soaps, etc., etc. In 1860, the Japanese Embassy were shown through his establishment, and the daily papers contained full accounts of the visit, some of them publishing lengthy descriptions of the manufacturing processes witnessed by their representatives. When so many industries are represented in this volume, it would be impossible to go into the minute details of the manufactures of any one of them, therefore no such effort is made in this particular case, however interesting it might be. The products are as varied as those of any other establishment of the kind in the world, and are unsurpassed in quality. The proprietor has successfully competed with foreign manufacturers in producing fragrant perfumes and delicious extracts, and has succeeded in bringing about a demand for goods peculiarly his own. He imports them in all their variety to the Canadas, South America, Mexico, Cuba, and the West Indies generally. His name and productions are familiar to every city, village, and hamlet of the United States. In his business he adheres to his own manufactures strictly, and deals largely in printers' ink to keep them before the public. In his manufactory forty hands are employed, who manufacture goods of an average annual value of $300,000. He uses internal revenue stamps to the amount of $1500 monthly—a noticeable coincidence, his capital, when he started in business, only amounting to that sum. The manufactures consist of cologne, flavoring extracts, pomades, shaving cream, tooth pastes, cosmetics, fancy soaps, rose water, etc., etc., etc., ad libitum, no small proportion of them being the discoveries of the proprietor. The operations of the establishment are thoroughly departmental,

X. BAZIN.
STEAM TOILET SOAP WORKS
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STEAM FANCY SOAP WORKS
AND PERFUMERY.
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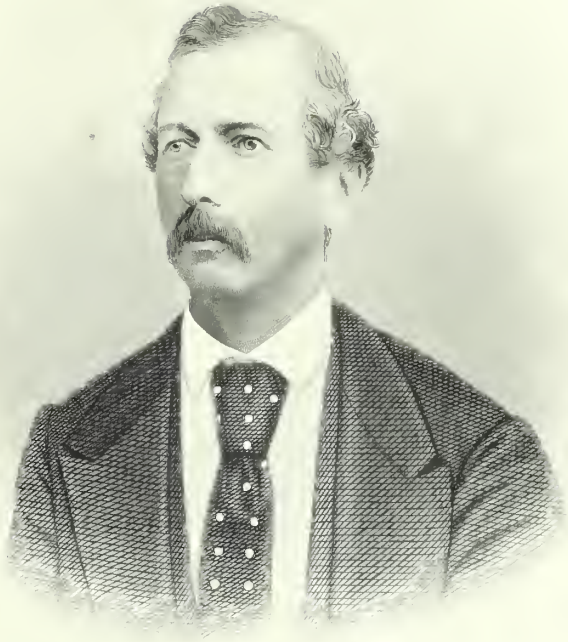


A. Barnes

the delicacy of the business rendering this absolutely necessary, as a single mistake in the mixing of ingredients would probably result in the loss of thousands of dollars, and could not possibly be remedied. Thus a careful system is preserved, and the proprietor still attends to his business, spending the greater portion of his time in the manufactory and at his desk in the counting-room. His two eldest sons aid him in the business, and devote all their time to it.

XAVIER BAZIN was born, October 16th, 1816, near the city of Paris, France. He was the son of Francois Bazin, a farmer. He attended school until the age of eleven, when he was apprenticed to learn the perfumer's art with a manufacturer at Paris. Becoming proficient in this, he was employed for several years in first-class establishments of Paris, among others the house of Piver. Receiving an advantageous offer from a manufacturer engaged in the same business in Philadelphia, he removed thither with his family in 1842. His successful business career in this country from that date is traced above. He has been awarded ten first premiums and five diplomas for the excellence of his manufactures, and a prize medal from the World's Fairs of London and New York, in 1851 and 1853, respectively. He has been married twice, and of his seven children five survive. Two sons, Charles and Felix, have been educated in France, and have studied chemistry, etc., with a special view to succeeding to their father's business, and maintaining its great reputation.

APOLLO FIRE-BRICK WORKS, Westmoreland county. These works were organized, in 1863, by Isaac Reese, James M. Taylor, John C. Taylor, and Thomas Johnston. They cover about an acre of ground, at Apollo, Westmoreland county. At that time about twenty-two hands were employed, and the number of bricks manufactured the first year was about 600,000. The increase in the annual production has been constant since that time, until now it averages 1,300,000 bricks, valued at about twenty-five dollars per thousand, according to the state of the market. The number of hands now employed, when in full operation, is about thirty-five. The trade is confined principally to Allegheny county, with some little shipping to Ohio. The Apollo fire-brick is of the second quality—that is, it is not manufactured from the best clay. John McMath bought out the interest of Thomas Johnston in 1866, and in 1869, Adam Maxwell bought out that of the two Taylors. In 1870, Isaac Reese purchased the whole business, and since then has been the sole owner and manager of the works.

BOLIVAR UNION FIRE-BRICK WORKS, Reese, Hammond & Co., Proprietors. These works are situated at Bolivar, Westmoreland county, and were purchased from Jackson Levingood, in 1866, by a firm composed of Isaac Reese, John McMath, and Thomas and James Hammond. In 1867, John McMath sold his interest to B. F. Reese, a brother of Isaac. The shares of the partners are equal. The number of hands employed is about twenty-two. The quality and price of the brick here manufactured is the same as that of the Apollo, and the annual production averages 1,200,000 bricks. The firm owns 600 acres of land here, and the improvements thereon consist of the fire-brick works, a grist-mill, a saw-mill, and a store. This enterprise has been very successful, and the works are valued at $50,000.

WOODLAND FIRE-BRICK COMPANY. The works of this company are located at Woodland, Clearfield county, and are owned by Isaac Reese, B. F. Reese, John McMath, Thomas and James Hammond, and William, George, and Henry Albert. They were founded in 1869. Two years later the Hammonds sold their interest to John McMath. The latter resold it to two other parties, but they withdrew in 1872. The number of bricks manufactured the first year was about 900,000. But the capacity of the works has been largely increased since then, and now reaches 3,500,000 annually. The Woodland company has leased another works to aid in filling its contracts, and employs about 125 hands. The property, machinery, etc., is valued at $100,000. The brick here manufactured is of the first quality—in fact, the best. It is specially adapted to the Siemen's Gas Furnace, and is invariably used for this purpose, in preference to any other, in Pittsburgh and vicinity. It is also largely used and specially adapted for blast furnaces. There is a constant demand for every brick manufactured by the Woodland company.

EMPIRE FIRE-BRICK WORKS, Reese, Lemon & Co. The above works were only erected in 1874. The firm owning them is composed of Isaac Reese, B. F. Reese, John K. Lemon, and James M. and John C. Taylor. They began operations in September, 1874, and for three months averaged 100,000 bricks per month. But the capacity is 3,000,000 a year. These works are located at El-

lerslie, Allegheny county, Maryland, about six miles from Cumberland. The quality of brick manufactured is in no way inferior to that of the Woodland, and is used for the same purposes. The firm owns about eight acres of ground, on which the works are located, and the property, with the improvements, is valued at $60,000. The Pittsburgh offices of all the above firms or companies is at No. 371 Liberty street.

ISAAC REESE, the leading member of all the above firms and companies, was born in South Wales, Great Britain, in 1821. His parents emigrated with their children to this country in 1832. They at first settled at Phœnixville, Chester county, where Isaac attended school. From thence they removed, in the following year, to Huntingdon county, and again, in 1834, to Bellefonte, Centre county. At the latter place the family resided for two years, and then removed to Pittsburgh. Isaac was now old enough to go to a trade, and he served an apprenticeship to learn the business of "hammerman" in one of the iron mills of Pittsburgh. For over twenty years he followed his trade, more than half of which time he was employed in the extensive mills of John H. Shoenberger. He saw an opening to engage in fire-brick making in 1863, and, although not having much capital, and but little knowledge of the process of manufacture, he entered into it with great energy and a determination to succeed. He possesses natural business qualifications, and a physique well able to sustain the wear and tear of his very active business life. From boyhood he has been familiar with hard labor, and to-day the mental strain of business is commensurate with the physical taxation of his earlier years. He has been a very successful manufacturer, and represents the largest fire-brick making interest in the United States. He has thoroughly mastered the process, and devotes all his time to the companies with which he is connected, and in which he is the ruling spirit. He has served a term in the Councils of Pittsburgh, is a member of the Fourth Baptist Church there, and is a widely known and much respected citizen of that city.

BRIGHTON PAPER MILLS, Frazier & Metzgers, Proprietors. These mills are situated on Beaver river, at Beaver Falls, in Beaver county. The original mill was located some two miles below its present site, and was built by Johnston, Stockton & Fulton, in 1826. They made writing paper by hand labor. Five years later the mill was removed one mile farther up the river, and the ownership had then been transferred to McElroy & Leese. They introduced machinery into their manufactures. In 1849, the manufactory was removed to its present site by A. Robertson, who at that time made wall and printing paper. In 1864, the business was purchased by Perkins & Co., who organized, in the same year, a joint stock company, known as the "Pittsburgh Paper Manufacturing Company," under a charter granted by the Legislature of the State. The company sold out to Frederick and Martin Metzger and William Frazier. This was in 1868, and the firm of Frazier & Metzgers have managed the business with success ever since. The manufactory is provided with the best water power on Beaver river, which is obtained from a pool seven miles in length. It also has steam power for cases of emergency, low water, etc. The products are printing, manilla, roofing, and wrapping papers. The amount of paper made in a year averages nearly 1,500,000 pounds, consuming about 2,500,000 pounds of stock. Twenty-four hands are employed, one-fourth of whom are women. William Frazier, the senior partner, has spent nearly a lifetime in the business of paper manufacturing, and gives his personal and undivided attention to managing the mills at Beaver Falls. Frederick Metzger is a paper salesman of many years' experience, and superintends the finances of the firm at the warehouse, 32 Wood street, Pittsburgh. All the products are sold through the warehouse, thus leaving the working partners free to attend to the departments assigned them. Martin Metzger has had several years' experience in paper manufacture, and attends to the buying of material. The firm attribute their success entirely to their departmental mode of conducting their business, and to an earnest endeavor to meet the wants of the trade. The mills are in the best of order, and the owners take pains to keep them so.

CORYDON WINCH, Manufacturer of Railroad and other Spikes, Philadelphia. The origin of this large concern is somewhat peculiar. The proprietor, whilst travelling, in 1846, for the benefit of his health, chanced to meet a neighbor, in Nashua, New Hampshire, who had invented a machine for the manufacture of spikes, and loaned him some thousands of dollars to enable him to carry out his design. The party, however, proving unreliable, he eventually bought out his interest and continued the business himself. In 1856, he put two machines

Frigate "Minerva," Plymouth.

in operation in New York city, with the intention of selling them; but, believing the business to be a profitable one, he built a factory in Jersey City, where he continued the manufacture of spikes till 1860. At this period he became convinced that Philadelphia offered a better field for his operations than Jersey City, and moved thither. For two years he ran some machines in connection with Robbins' Rolling Mills; and, in 1862, purchased the building on Canal street above Laurel, having an area of 170 by 107 feet, to which he built several additions at various times. With regard to capital he began under unfavorable circumstances, having lost considerably at the commencement of the war; but, by a good name, energy, and a determination to conquer, he succeeded as well as he could desire. On starting he employed but few hands, and did not turn out over two tons of spikes per day. The business, however, gradually increased, and was greatly augmented by a new feature which he introduced, viz.: that of subjecting scrap iron to but one "heat" in the manufacture of spikes, thus saving considerable expense in the production. Year by year, as the business developed itself, greater space and facilities were required, and he has found considerable difficulty in obtaining the necessary room. In April, 1874, he purchased a lot 80 by 160 feet, on Canal street, above his old location, and erected an extensive establishment. At the present time these works turn out an average of twenty tons of spikes daily, and employ about seventy-five hands in the production thereof. Undoubtedly one of the causes which have contributed to his success is the improved method of utilizing scrap iron in his manufactures; but its chief source will be found in the man himself. He has always worked his way quietly and carefully, maintaining a good financial credit, and showing himself to be a man of his word, strictly honest and prompt in his dealings, never misrepresenting anything and always to be relied on. Such qualities have led to his present prosperity, and, while building up his own fortune, he has contributed to advance the industrial importance of the city and the State.

CORYDON WINCH was born in Newton, Massachusetts, in 1815, and is the son of Nathaniel Winch, a farmer in the same county. His education was limited, and at the age of fourteen he entered a cotton factory, where he remained some four years; but, disliking that occupation, he obtained a clerkship in a country store, at Nashua, New Hampshire, staying in that position until he was of age, when he bought the interest of his employers, and, having good credit, met with success. He then entered into partnership with his uncle, continuing with him for about eight years, and making money slowly. Having dissolved the partnership, he carried on the business alone till 1846, when he sold out to his uncle, in consequence of ill health. He had by this time amassed about $20,000. He determined to travel for the benefit of his health, and did so for eight years, during which time he met with the inventor of the spike machine, and was led into his present business. He has been twice married, the second time to Sarah R. Roman, of Maryland, by whom he has two children.

THOMAS BARNES' SAFE WORKS, Pittsburgh. This old and important industry was established in 1845, by Edmund Burke and Thomas Barnes. Hardly a half dozen hands, including themselves, were employed at the time. One partner was by trade a carpenter, and the other a blacksmith. The workshop occupied No. 126 Third avenue, nearly opposite the present location. The firm of Burke & Barnes became very successful, and the excellence of their work increased their sales from year to year. It is the oldest works of the kind in Pittsburgh, and has the confidence of a very large and wealthy manufacturing centre. The firm were the original lessees of the celebrated Wilder patent for western Pennsylvania and eastern Ohio, at the same time that Herring held territorial rights for New York. After a long and harmonious business association, the firm of Burke & Barnes was dissolved by the withdrawal of Mr. Burke, in 1872. Advanced in years and possessed of a competence, the reward of a life of industry, he retired to a small farm in the vicinity of Pittsburgh. His partner, then in the sole control of the business, began to push it with renewed energy and to introduce improvements in the construction of the safes. He is now introducing an improved fire and burglar-proof safe, which he claims will surpass in durability and finish anything of the kind ever manufactured in the United States, which would of course make it the strongest in the world. Some of these safes are of mammoth size, and marvels of mechanical skill. About 300 fire-proofs are manufactured annually, exclusive of burglar-proof work and vault doors. Some thirty hands are employed, and as a general rule there is a constant demand for every safe as soon as it leaves the finishers' hands. The annual manufactures are

valued at from $50,000 to $75,000. The office and manufactory has been located at 129 and 131 Third avenue for some years.

THOMAS BARNES, sole proprietor of the above works, was born in Dublin, Ireland, in 1817. What education he possesses was received there. He emigrated to America, and settled in Pittsburgh in 1836, and has ever since resided there. He first worked for John Scott, who carried on the safe manufacturing business in both Philadelphia and Pittsburgh; was with him a year and a half. He never served an apprenticeship to any trade, but picked up that of blacksmithing at various places. He worked at the forge for Constable, Burke & Co. for three years, and then associated himself with Edmund Burke, as above mentioned. His business career has been prosperous, and the work turned out at his establishment is met with in not a few of the banks, business houses and manufactories of the Iron City and surrounding country. His name and business integrity are well known in the business circles of western Pennsylvania, and he has been connected with his present business ever since the asbestos safes were first made. He is a director in the City National Bank, of Pittsburgh, and was at one time, years ago, a member of the City Councils.

PARK MILLS, Porter & Dickey, Proprietors, Philadelphia, are devoted to the manufacture of textile fabrics. The office and principal works of the firm are at the corner of Howard and Norris streets. The enterprise was originated in 1861, by the present proprietors, who commenced business at Fifth street and Columbia avenue, each partner having had many years experience in his business. Such was their prosperity that in 1867 they were forced, in order to meet the ever increasing demands of their trade, to erect and occupy the present central factory. This edifice is a fine substantial brick building, thoroughly supplied with all modern improvements, six stories high, and 189 by 40 feet in size, with the office and counting-rooms on Norris street. In this establishment are employed about 460 hands, who run 325 power looms with the necessary machines in other departments. The firm operate two other mills in the city, located at Alter and Twenty-first streets, and on Nandain west of Twentieth street; here they also give employment to a very considerable number of hands, and run a large number of looms. Their monthly pay-roll adds a valuable item to the labor fund of Philadelphia, in which city is situated only the weaving establishments of the house. The spinning is done in other factories outside the city. This house furnishes direct employment to about 1000 hands; while indirectly, in the way of transportation and other work constantly called for, many more receive a livelihood by its enterprise. The Park Mills goods have a high reputation throughout the United States, and embrace checks, cheviots, cottonades, flannels and linseys, which for fast colors and durability are unsurpassed by any similar grade in the market. About $1,000,000 worth are produced annually, and the trade is steadily on the increase, these goods being regarded as staple articles of stock in all dry goods establishments. The firm have also a large business house, 83 Leonard street, New York city. Through this branch most of their manufactured goods are distributed; here, too, they receive the productions of other mills and transact a large commission business, possessing extraordinary facilities for controlling and handling a large quantity and great variety of goods. The Park Mills products have been celebrated ever since their introduction, in 1861, and such has been the uniform demand for them that the extensive mills have been kept running on full time while many first-class factories have been idle for a considerable period. This fact fully indicates the skill and administrative capacity of the proprietors.

EAGLE FILE WORKS, Pittsburgh. The foundation of this establishment was laid in 1840, by John England, a native of England. It is situated at Twentieth and Pike streets, near the Allegheny river. At the opening of 1874, eighteen hands were employed, which number is being gradually increased. In 1868, Thomas England, a son-in-law, was admitted into partnership. Mr. England, senior, had for many years carried on the hardware business in connection with the manufacture of files, and John Bindley, who had been in his employ from boyhood, was admitted into partnership in 1868, and placed in charge of this department of the business. Thomas England has charge of the file works, and devotes his time entirely to this department, the senior member of the firm being advanced in years and having retired from active business. The Eagle File Works are the only industry of the kind in the city of Pittsburgh, and the oldest manufactory in the State west of the

GALAXY PUB. CO. PHILA.

Imperial Refining Company

OIL CITY, PENN'A.

Alleghenies. The works are in a prosperous condition, and a ready market for the products is found, principally in Pennsylvania and Ohio. Skilled labor is difficult to obtain. At this writing (December, 1874), extensive building improvements are contemplated, with a view to meeting the great increase in their business since 1872.

JOHN ENGLAND, the senior member of the firm, was born near Sheffield, England, in 1801. He is a file-maker by trade, having served an apprenticeship of eight years to the business at a time when the indenture laws were very strict, and when "freedom papers" were as necessary to those engaged in manufacturing as licenses to those engaged in inn-keeping. He came to Pittsburgh in 1840, and almost immediately engaged in the manufacture of files in a small way. At that time files were mostly imported, and none were manufactured west of the Alleghenies. Thus it will be seen that he was the pioneer in this industry in the West. He was never associated in a partnership until the two young men above mentioned were given an interest in the business. For some years he has practically retired from business, although a sturdy man for his age. He attributes his success in business to his thorough knowledge of file manufacturing, and to having devoted a lifetime to the business on a safe basis.

IMPERIAL REFINING COMPANY, Oil City. This company was organized, in 1872, by Jacob J. Vandergritt, John Pitcairn, Jr., George V. Forman, John Gracie, and others, with a capital of $200,000, for the purpose of refining the crude petroleum as it issues from the well. At the time of going into operation, the works were calculated to afford a capacity of 500 barrels per day. In 1873, this capacity was doubled, and they were enabled to produce 1000 barrels every twenty-four hours, employing about fifty hands. In the course of a few months, the company propose to still further augment their works, so as to turn out 2000 barrels each day, and this will give employment to seventy-five hands. They claim to manufacture more refined oil than any other works, and up to the present time (February, 1875) have never ceased operations, notwithstanding the financial distress which has prevailed throughout the country. Their productions find a ready market in New York, to which point they are all shipped, and they have never received an intimation that their products were not up to the standard, nor has a single barrel been pronounced "off color." In treating the oil they use about seventy-five carboys of acid to every 1800 barrels of distillate. The works cover an area of 15 acres. The oil is received direct from the wells through their pipe lines, thus avoiding any evaporation or loss by any other mode of conveyance. At the present time, they require about twenty cars per day to remove the products of the works. The origin of this great enterprise is mainly due to Jacob J. Vandergrift, who devoted his time, means, and influence to insure its success, and to his sagacity and prudent management is to be credited the high position the works have attained among the manufactories of Pennsylvania.

JACOB J. VANDERGRIFT was born in Pittsburgh, Pennsylvania, April 10th, 1827. His father, William K. Vandergrift, had long resided in that city pursuing his avocation of carpenter and builder; later in life, and during the childhood of the son, he engaged in steamboating upon the Ohio river, between Pittsburgh and Cincinnati. Jacob's educational advantages were very meagre, for, owing to the pecuniary misfortunes of his father, he was at an early age thrown upon his own resources to gain a livelihood. At sixteen years of age he obtained a situation upon a steamboat plying upon the Allegheny. The energy and close attention to duty which he at all times exhibited attracted the attention of his employers, and he gradually attained positions of higher importance until, in 1853, he had risen to the command of the "Hail Columbia," at that time one of the finest steamboats upon the Wabash river. In this position he remained for several years, trading between Pittsburgh and Lafayette, Indiana. In 1860, he retired from river life, and, going to Western Virginia, became interested in the oil sections of that country, and was proceeding in his arrangements for obtaining that product when interrupted by the commencement of the Civil War. He was finally forced to leave the State, abandoning his operations and sacrificing his investments. Nothing daunted by the discouraging circumstances attending his first venture after oil, in 1862, he moved to Oil City. This locality at that time was almost a wilderness, the great business in the earth's product being then in its infancy and the market supply limited. Here he engaged in trade as a dealer and shipper, and in this line continued until 1865, at which date he commenced operations as a producer in connection with his already established business, associating

with him a partner and dealing under the firm-name of Vandergrift & Co. This co-partnership continued for two years, when it was dissolved and a connection formed, in 1868, with George V. Forman, under the style of Vandergrift & Forman. The house, dealing in oil and also carrying on the shipping of it, soon assumed large proportions, and rapidly grew to be the most enterprising and extensive in its line of business. Subsequently the partners commenced the construction of a series of "Pipe Lines," ingenious and valuable assistants in the speedy and economical transportation of the oil from the wells to various points of shipment, and also to the refineries. These pipes are two inches in diameter, and, as a general rule, from six to eight miles in length. One of the lines of this company, however, is thirty miles in length, that one being the longest pipe line in the country; they are the proprietors also of a pipe line three inches in diameter, the only one of the size in use either in Oil City or in the adjacent region, the latter arrangement having been rendered necessary on account of the unusual and excessive productiveness of their wells. So rapidly did their trade prosper and increase after the formation of the firm, that they were necessitated to build line after line, until, at the present time, they possess considerably more than three hundred miles of pipe, while several of the lines run constantly five or six pipes. Upon several occasions they have handled the major portion of the whole production of the oil country, becoming thereby the recipients of handsome pecuniary returns. The lines are now known as the United Pipe Lines of Vandergrift, Forman & Co., and form a perfect and ramifying network extending throughout the oil country, and terminating at four grand shipping points, viz.: Brady's Bend, on the Allegheny Valley Railroad; Monterey, on the same road; Harrisville, on the Shenango & Allegheny Railroad; and Ray Milton, on the Lake Shore & Michigan Southern Railroad. In addition to their trading and shipping interests, they may be ranked also among the heaviest producers in this section of the State, and are prominently and importantly identified with several banking institutions and financial enterprises in Butler and Venango counties. Jacob J. Vandergrift was married, in 1854, to Henrietta V. Morrow, of Pittsburgh.

GEORGE V. FORMAN was born in Hunterdon county, New Jersey, December 3d, 1843. His parents were Hamilton Forman and Mary (Vansyckle) Forman, both residents of the above-mentioned State. After completing a preliminary course of elementary studies, and when in his fifteenth year, he entered Princeton College, and graduated from that institution in 1861. Entering the law office of A. G. Richey, of Trenton—one of the ablest leading practitioners of the New Jersey bar—he devoted his entire time and attention to the acquirement of a thorough legal education. At the expiration of one year, however, he moved to the Oil Regions of Pennsylvania, and, in 1863, commenced to operate in oil there, and also in the neighboring territory. For several years his speculations, in company with those of many others, were unsuccessful and discouraging; but, undaunted by repeated failures, he manfully persevered, trusting that success would eventually crown his efforts. In 1868, he became associated in partnership with Jacob J. Vandergrift. Although warmly interested in the public welfare, and a decided exponent of his views on all matters involving its interests, he has always manifested an inflexible unwillingness to permit himself to be drawn into the arena of political life. Contented with pushing forward his business to still greater prosperity, he gladly leaves to others the tumults and agitations of a partisan career, while advocating the election of this candidate or condemning the election of the other, in accordance with his conscientious convictions. As a business man, he possesses the entire confidence and esteem of a large circle of merchants and operators; and as a citizen, he is one of the most influential men in the oil region, while the benefit arising to the State from his energetic and efficient efforts in aiding to develop its vast natural resources entitles him to consideration as a public benefactor. He was married, in 1868, to Martha Carter, from Patterson, New Jersey.

LOYALHANNA PAPER MILLS, Metzger & Peters, Proprietors, Pittsburgh. In 1864, J. J. Bierer and W. H. Watt purchased about three acres of ground on Loyalhanna creek, Latrobe township, Westmoreland county, Pennsylvania, and erected a paper mill thereon. They sold the property, in April, 1871, to J. C. Thompson, G. S. Christy, and John M. Ray, known as Christy & Co. They disposed of it to Edward Metzger and James Peters in October of the same year. This firm has been running the mill very successfully ever since. They manufacture roofing and wrapping papers, and produce from 2500 to 3000 pounds daily, employing from twelve to fifteen hands. The mill is

in better condition now than at any time since its erection. The last purchasers (Metzger & Peters) have achieved success by giving personal attention to their manufacturing as well as financial interests. They worked their way into the possession of this property by unflagging industry, both being hard working men. Both are yet in the prime of life. They claim to make the best straw paper in the Pittsburgh market. Their warehouse and office is located on Wood street, near Second avenue, Pittsburgh, Pennsylvania.

GIBBS & STERRETT MANUFACTURING COMPANY OF TITUSVILLE AND CORRY. F. H. Gibbs, President; F. W. Andrews, Vice-President; A. A. Aspinwall, Secretary; W. B. Sterrett, Treasurer. In 1864, F. H. Gibbs and C. Wheeler became sole proprietors of what was then known as the "Novelty Iron Works," located at Munda, New York, and managed them successfully. In 1866, they recognized the advantages that would follow their business if it were conducted in the oil regions, where wells were being sunk so rapidly and extensively, and they accordingly opened their shops at Titusville, and to-day rank second to none in the quality of their productions, which are varied and numerous. When the Titusville branch was opened, Gibbs & Wheeler associated with them John T. Russell, and the firm then became Gibbs, Wheeler & Russell; but, in 1867, Wheeler disposed of his interest to Gibbs and retired from the firm. In 1868, W. B. Sterrett purchased a third interest in both the Munda and Titusville works, and the style then was known as Gibbs, Russell & Sterrett. In 1871, A. A. Aspinwall purchased of the latter firm a fourth interest in the concern; and, in 1873, these gentlemen formed the present organization, and the Gibbs & Sterrett Manufacturing Company came into existence, with a paid-up capital stock of $600,000. The company purchased the works of the "Climax Mower and Reaper," which were located at Corry; and the works at Munda, that had been the property of Gibbs, Russell & Sterrett, were closed, and their business transferred to Corry. The present company manufacture all descriptions of steam boilers and engines for mills of all kinds; also drilling tools and all the supplies required for oil and artesian wells. Their trade in these products extends to almost every quarter where appliances are needed for mining purposes or sinking of wells. They ship their goods to South America, the East and West Indies, Australia, and most of the foreign countries where mining is carried on; and their supplies for artesian wells have been sent to Austria, Russia, Java, Mexico, and all through the silver-mining districts. In fact, they make a specialty in furnishing complete outfits for oil and artesian wells, and are almost constantly in the receipt of large orders for these articles, having acquired a reputation for excellence of finish, as well as for the superior quality of the materials used by them in their line of manufactures. The engines and boilers constructed by this company are also to be found in many of the large mills throughout the country, and their present owners bear testimony to the superior workmanship of the builders, and add to the reputation of the concern. This reputation has been established by the exclusive use of the best brands of iron and steel that could be obtained for their purposes; among the many fine irons employed, large quantities of Norway iron are consumed. The company also manufacture the "Climax Mower and Reaper" to a very considerable extent. These are made at their works in Corry, and large numbers are produced annually, which find a market all over the United States, and for the sale of which depots in New York city, Chicago, and St. Louis have been established by the company. Five hundred men are constantly employed in the works, and they have the capacity to increase this number to a thousand, should there be occasion for their services.

PHILADELPHIA PLANTATION AND ROAD WAGON WORKS, Wilson, Childs & Co., Proprietors. This house was founded, in 1829, by David G. Wilson and John Childs, who established a factory in that year at the corner of St. John and Buttonwood streets. They were both practical workmen, the former being a wheelwright and the latter a blacksmith. The factory was at first simply a small frame building, but good workmanship and business-like attention made the undertaking successful, and it quickly increased in size. The products of their works became in demand in various parts of the country, and especially in the Southern States, where their plantation wagons acquired great repute. They also became engaged in the construction of army wagons for Government use, and the first army wagon made after General Crosman's improved pattern was built by them. These wagons are made with the greatest exactitude and care, and are minutely examined by a Government

inspector. As their trade increased, they correspondingly increased the works, until the buildings extended 230 feet by 113, having fronts on three streets, St. John, Third and Buttonwood. The business continued still to extend itself, and in 1850, in order to meet the necessities of their trade, they bought a property at Lehigh avenue and Second street, which consisted of two whole squares of ground, one on each side of Second street. The lot on the east side is 500 feet by 248, or about three acres, and is used as a lumber yard, where a large and valuable stock of hard wood planks and boards —averaging about 2,000,000 feet—is always kept. This is carefully stacked, every plank being marked with its exact number of feet, and allowed to remain until thoroughly seasoned, which requires from one to five years' time; the usual allowance being one year for every inch in thickness. The yard is surrounded by a continuous covered shed, in which are piled about 30,000 hubs and 500,000 spokes. A certain time is also allowed for these to become further seasoned and dried, the hubs having a hole roughly drilled through them to assist the drying process. The greatest precautions are taken throughout the whole of the manufacture in order to insure the utmost obtainable dryness in all the wood used, so as to obviate the possibility of shrinking. The kind of wood chiefly used is white oak, which serves for the great mass of the work, a comparatively small quantity of hickory being also kept in stock for light spokes and the "running gear" of light express wagons, etc. The hubs are the part of the work which requires the greatest toughness and hardness, and, being a section of the whole growth of the tree, are also most liable to decay. An especially hard and sound wood is therefore needed for this part, and black locust wood is the sort almost universally used for hubs, especially for the Southern trade, this wood being absolutely impervious to decay. For Pennsylvania trade gum wood is often used. There is also in this portion of the works a complete saw mill, which is reserved for the needs of extra pressure of work, and a storehouse for sawn and prepared wood. The value of the stock on this portion of the premises alone is, at the lowest calculation, over $100,000. The square on the western side of the street is 500 feet by 273, or more than three acres in extent, and contains the various workshops. They consist of the following: a brick building, three stories high, and 100 feet by 46, used as a wheel and body shop; this is the original factory, which was on the ground when first purchased; a brick building, two stories high, and 240 feet by 50, also used as a wheel and body shop principally, but containing, in addition, storage room and painting and varnishing shops; a brick blacksmith's shop, 300 feet by 35; this shop is not only one of the largest blacksmith's shops in America owned by a private firm, but also one of the best arranged; it is high and well ventilated, so that all gas and sulphur are carried off, a point of great moment for the health of the workmen; it has thirty-three forges, a machine for punching, one for making bolts and rivets, a steam hammer, tire-bender, etc., etc.; the saw mill, engine house and machine shop, 80 feet by 45, and three stories high; running gear shops, 100 feet by 45; together with boiler house, paint shops and a variety of auxiliary buildings. Every part of the wagon, with the exception of the springs, is made on the premises. The saw mill contains four upright and six circular saws; a machine for boring a hole in the centre of the hub; another for boring holes for the spokes; four drills for drilling iron. In other shops there are a planing machine, a mortising machine, four machines for turning spokes, machines for driving in the spokes and shaping the felloes and finishing them, and a machine for boring hubs exactly and to insure accuracy and solid bearing in the boxes. The hubs are turned in a lathe, and both ends sawn at once by circular saws. In other shops the wheels and running gear, shafts, tongues, etc., are prepared. The bodies also require great subdivision of labor, each particular part having its own workman. In the machine shop the iron axles are turned, screws and nuts cut, with a variety of other details. In the blacksmith's shop all the iron work is made—hoops and bands, tires, straps, bolts, rivets, staples, etc. Finally, there are buildings devoted to painting, storage, etc. In one of the latter, exclusively appropriated to wheels, there is constantly kept on hand a stock of about 5000 wheels of all sorts and sizes. This firm have lately adopted a new patent for the making of wheels which is deserving of special notice, inasmuch as it is probably destined to entirely supersede the old method of making spoked wheels. It is called the Archibald Iron Hub Wheel. Instead of being driven into a wooden hub, the hub ends of the spokes are made wedge-shaped, and are pressed together like the sections of an arch by a machine of great power, by which means they are forced into a compact whole. Two iron plates or flanges, one of which has the box attached, are then placed evenly on the flat surfaces thus formed, and bolted securely through. These iron-hubbed wheels are becoming very popular, and it is claimed that, by putting on a pressure of more than ten times the amount which the wheel will ever be called upon to sustain in actual use, the spokes and

felloes are so compacted that, if the tire is properly set, it will remain tight until worn out. Wheels made by this method are perfectly round and true. The pressure distributed about the rim can be graduated from nothing to 100 tons, as may be required. It is also claimed that a wheel made on this plan will not shrink, and that, as the bases of the spokes are as tightly compressed against each other as it is possible for wood to be, and firmly held by metallic flanges strongly bolted together, it is the most mechanical and perfect method of constructing wagon wheels for heavy work which has ever been devised. The capacity for production of this large factory is immense. The firm can turn out easily about 300 wagons of all kinds per week, and the enormous stock of prepared material constantly kept on hand enables them to produce everything in the shortest time, of the best quality and in the most complete state. Besides, they keep a stock of about 150 tons of iron. The number of hands employed averages about 250. They make every style of wheeled vehicle in use for carrying purposes, from the small wheelbarrow and push-cart up to the huge "catamaran," a heavy machine for moving blocks of marble, granite, etc., the wheels of which are from 8 to 12 feet high and proportionately gigantic in every part, which costs about $2000 to build, takes a dozen horses to draw it and will transport twenty or thirty tons. Their special line of trade, however, is the making of plantation and farm wagons. The old establishment at St. John and Buttonwood streets was continued up to the year 1865, when the whole factory was finally removed to the new site, retaining the office only at the old place; this latter has now (1875) been removed to 475 North Fifth street. The firm have also a warehouse in New Orleans and an agency in Mobile, Alabama. In 1860, David G. Wilson, one of the founders of the house, died, and, in 1874, his partner, John Childs, also died. The present firm consists of William M. Wilson, Charles N. Childs, David G. Wilson and J. Henry Childs.

WOODS, JOHNSON & CO., Barrel Manufacturers, Union and Titusville. The manufactory at Union was started some twelve years since by Stranahan, Sherwood & Co., and operated by them until 1866, when it came into the possession of Woods & Johnson. It was but a small, crude concern, but the new proprietors gradually increased it, as their trade extended, until now, including the yard room, it covers an area of fifteen acres. The works consist of a large one story shop for finishing off the barrels, measuring 500 feet by 30 feet; two coopering shops and two machine shops, each 100 feet by 40 feet dimensions. During 1874 there were 300,000 barrels manufactured, valued at $700,000; this includes the number of staves made for pork barrels and forwarded to the Boston market. The amount of iron used per week for hooping the barrels is valued at $4000. The present capacity of these works is about 1700 barrels per day. In April, 1874, the firm erected their establishment in Titusville, consisting of a building two stories high and measuring 62 feet by 244 feet, with all the necessary outsheds, etc., to season and dry the lumber and staves. They have the very best of machinery in use, and everything about the works is complete and excellently arranged. This Titusville shop can turn out 2200 barrels per day. The two works give employment to about 500 men. The market for the barrels produced at Titusville and Union is strictly a home one, the oil producers and refiners being their principal customers. The members of the firm are all active, energetic business men, and industrious. They attribute their success to the great care they exercise in the selection of the material, so as to produce nothing but a No. 1 article.

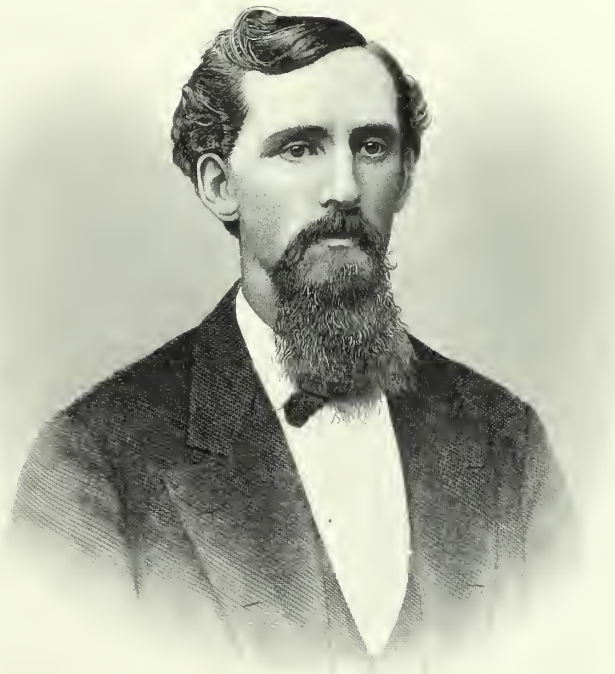
BETHANY DISTILLERY, Westmoreland county. This distillery was founded by Samuel Dillinger, about the year 1832. It was then a very primitive concern, and so continued for many years. It was run entirely by hand labor, and its products were hauled to Philadelphia and other places. Upon the completion of the Baltimore & Ohio Canal, the business was given an impetus and new markets were opened up. Later, when railroads were introduced, it became a still more extensive establishment. The town of Bethany lies some forty miles from Pittsburgh, by rail, and is a quaint old place. After a successful business career of a quarter of a century, the proprietor found that his distillery had not the capacity to supply the wants of his now important trade, and that he must keep pace with the progress of the times. In 1856, he erected a new distillery—a building 50 by 95 feet, and five stories in height—and introduced all the newest improvements. The new distillery has been in constant operation since its erection, and a ready market is found for its products, from the Atlantic to the Pacific and from the Gulf to the Lakes. The largest quantity, however, is shipped to New York. The liquor distilled is what is

known through the length and breadth of the land as "Monongahela Pure Rye Whiskey," and its great and enduring reputation for purity and excellence is largely due to Samuel Dillinger, who has devoted nearly half a century to its manufacture. The hands employed number about fifteen, and the capacity of the still is 3000 barrels annually, valued at $180,000, more or less, according to the state of the market. The Bethany is the oldest distillery in the State west of the Alleghenies.

SAMUEL DILLINGER, one of the oldest distillers in the United States, was born in Fayette county, in 1810. He was the son of a farmer, and was raised to a life of hard work. His education, reared as he was in a sparsely settled region, and before common schools were dreamed of, was necessarily limited. He married at an early age, and bought a small farm for $12 an acre. He erected a small distillery, doing his mashing by hand and performing most of the labor himself. His success was such that he was enabled to purchase adjoining farms from time to time, until now he owns a tract of 600 acres, valued at $400 an acre. He is one of the most wealthy and influential citizens of "old Westmoreland," and has always led a temperate and abstemious life, never having upon a single occasion over-stepped the limits of extreme moderation in all things. He is thus left in the evening of life with an unimpaired constitution, and with sufficient vital energy to take an active interest in all his business affairs. He is interested in the coal and coke business, and is director in the Southwestern Pennsylvania Railroad, recently built, running from Greensburg to Connellsville and proposed to be extended to Charlestown, West Virginia.

DILLINGER, SHERRICK & CO.'S COKE FURNACES. These works were established in 1873, by Samuel Dillinger, A. H. Sherrick and J. L. Dillinger. They were put in operation upon the completion of the railroad from Greensburg to Connellsville, a distance of twenty-four miles. This road had long been projected, and many influential business men had interested themselves so far as to earnestly endeavor to persuade prominent railroad officials to take cognizance of the matter. After many failures by others, the diplomacy of J. L. Dillinger at last succeeded. He made bold to propose to Colonel Thomas A. Scott, the railroad magnate, to assume the responsibility of raising half the stock. The proposition was accepted, the promise was fulfilled to the letter and the road built. It was commenced in the spring of '72, and the last spike driven in the spring of '73—just one year being consumed in its construction. The sequel to this was that a very valuable coal region was opened up to the wants of the trade. The construction of the road is now being pushed to other points. The road is now one of the busiest freight-carrying branches of the Pennsylvania Railroad, about 200 car loads of coke alone being carried over it daily. J. L. Dillinger immediately interested himself in coke manufacturing, and associated with himself in the undertaking his father, Samuel Dillinger, and A. H. Sherrick. Their furnaces are situated at Pennsville Station, four miles north of Connellsville, on the line of the above new road. They are known as the Pennsville Coke Works. At the mines and works about sixty hands are employed, producing about 40,000 tons of coke annually. The vein worked has very valuable coke-producing properties, and is pronounced, upon the best authority, to be superior to the famed West Virginia coal. The coal field opened up by the new road is about fifty miles in length, and varies in breadth from one-half to one and a-half miles. The above firm owns about 900 acres of this belt, and is actively engaged in developing its resources. The enterprise is yet in its infancy, but the superiority of the coke produced bids fair to bring it into prominence as one of the most important industries of the kind in western Pennsylvania. J. L. Dillinger finds a market for the products of the works in the South, West and Northwest, and out as far as the Territories. He is warmly interested in this undertaking, and is the general business manager, with an office located at No. 87 Second avenue, Pittsburgh. A. H. Sherrick is the manager of the works at Pennsville. Samuel Dillinger is not an active partner.

JOHN L. DILLINGER, the founder of the above manufacturing business, was born at Bethany, Westmoreland county, Pennsylvania, in June, 1840. He received his education at Mount Pleasant College. Leaving that institution in 1859, he entered the well-known distillery of his father, at Bethany, as manager. He continued in this occupation until the breaking out of the war. He was commissioned to raise a company for the 28th Regiment Pennsylvania Volunteers, commanded by Colonel John W. Geary. Before he had completed this task, his company was consolidated with another. Failing to secure the captaincy, he preferred the ranks, although offered a subordinate



J. C. Dillinger

commission. He was in the army some fifteen months, mostly on detailed duty. Upon his return home, he actively aided in the recruiting of the 211th Regiment, and was offered the position of major in it. Although desiring to accept the commission, his father's business demanded his attention, and he reluctantly declined it. In 1865, he was admitted as a partner in his father's business, and the association still continues. Two years later he entered into a partnership, in the wholesale liquor business, with A. E. Stevenson, and their salesroom and warehouse is located at No. 87 Second avenue, Pittsburgh. This venture has been successful from the start, and the business is still carried on. J. L. Dillinger is a prominent Mason, and is socially held in high esteem by all his intimates. He combines a genial nature with rare business qualifications, and is the ruling spirit in all his enterprises. He is Vice-President of the Pittsburgh Bolt and Car-Link Manufacturing Company, which has as yet had but a short existence, but which is destined to become an important industry—located at New Brighton. In politics he is a Democrat, but during the war was a warm supporter of the administration then in power. In 1873, he was urged to become a candidate for the Mayoralty of Pittsburgh, but he refused to neglect his business to seek political honors, although the show of success was very flattering. He is married, and resides with a young and interesting family in one of the most attractive suburbs of Pittsburgh.

ACME OIL WORKS, Porter, Moreland & Co., Titusville. These works were founded in 1868, by B. Moreland & Co., and commenced operations with two small stills, each having a capacity of sixty barrels, and the total amount of capital invested was but $1500, and eight men were employed in the refinery. In 1869, H. B. Porter and John D. Archbald became partners in the concern, and the firm's name was changed to its present style of Porter, Moreland & Co. An immediate enlargement of the works followed, and two stills, each of the capacity of 500 barrels, were erected; and these were augmented by the addition of another of 2000 barrels. In 1874, still another was added, having a capacity of 3500 barrels, and is said to be the largest still in the world, as far as known (150,500 gallons). The company now own eight crude stills and fifteen tar stills (twenty barrels capacity each). About ninety hands are now employed in the works, and they can refine about 2000 barrels of oil per day. They have also two large agitators, in which they can treat about 2200 gallons per day. The refinery is situated on the south side of Oil Creek, and occupies an area of six acres. After the oil is refined, it is conveyed to their works, on the north side of the creek, by their pipe lines, where it is discharged into the tanks, which can contain at one time 150,000 barrels of oil. The works here cover about two acres. Adjoining the tanks is the barrel department, which is also alongside the railroad. The oil is barrelled and shipped to any desired point. This company has a very extensive trade, their markets being Philadelphia, New York and Boston. They own their own cars on the Boston line, in which they ship their refined oils. They attribute their great success to their strict attention to business and producing only a superior quality of oil; and the barrels bearing the brand of the "Acme Oil Works" enjoy a reputation for excellence justly earned. In 1868, as stated, their capital invested was but $1500; it is now not less than $800,000. Mr. Archbald resides in New York, and attends to business in that market; H. B. Porter is the financial manager, and B. Moreland gives his entire time and abilities to the works, which he is eminently qualified to conduct.

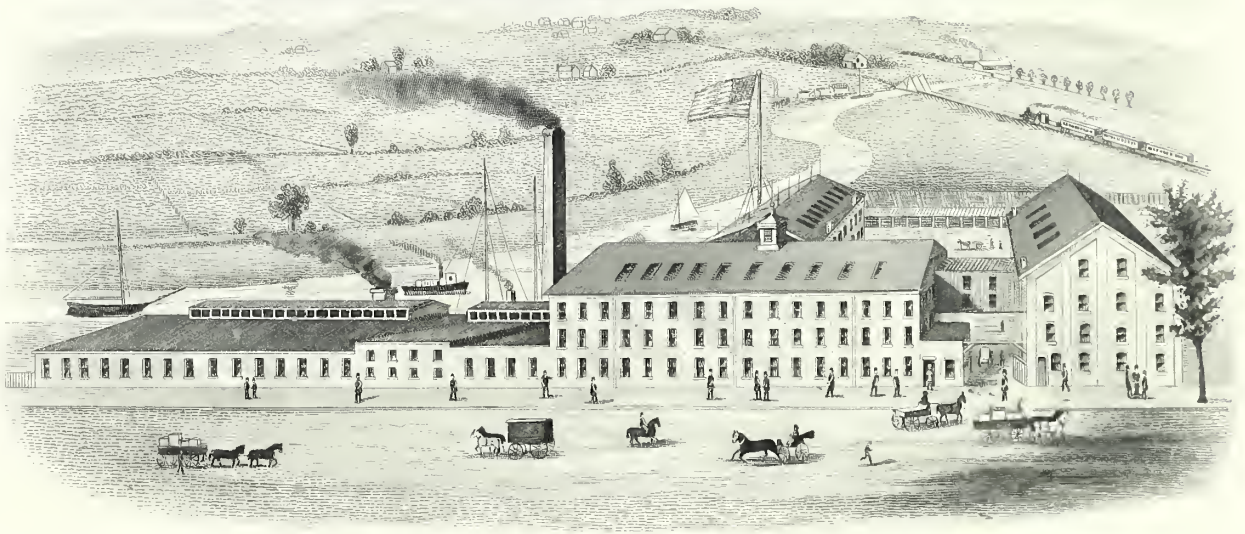
SOLAR IRON WORKS, William Clarke & Co., Proprietors, Pittsburgh, are located on the corner of Thirty-fifth and Railroad streets. The premises contain nearly three acres of ground and extend from the railroad to the Allegheny river. The business was established in the year 1869, on a capital of about $40,000, by William Clarke, E. Clarke, his brother, and Charles Fownes, under the firm-name of William Clarke & Co. Charles Fownes died in 1872, but his heirs retain his interest in the works, and the style of the firm has not been changed. The business from the first has been a success, and the capacity of the works has been steadily increased. Beginning with but four puddling furnaces, one train of muck rolls and an 8-inch mill train, the works at present contain seventeen puddling and five heating furnaces, and four trains of finishing rolls. The buildings are commodious and substantial structures. One of them is 150 by 130 feet in dimensions, and the other 130 by 100 feet. The production of these works is exclusively hoop and band iron. They are about the third in capacity in the United States, and when in full operation furnish employment to 200 hands. The aim of the firm has been to establish a reputation

for a superior quality of work, and they were the successful competitors at the Cincinnati Industrial Exhibitions in the year 1871 and again in 1873, taking in both instances the first medal. The capital at present engaged in the works amounts to $175,000, and the value of the annual production reaches half a million.

HULBURT & CO., Manufacturers of Lard and Machinery Oils, Philadelphia. The senior partner of this firm, Chauncey Hulburt, was among the very first to discover the lubricating qualities of petroleum and its products. It will be remembered that petroleum as a commodity first became known to the mercantile world in 1860, the eve of the great Rebellion. It will also be remembered that for many years the North had been dependent upon the South, more especially upon the State of North Carolina, for what were known in mercantile parlance as "naval stores"—tar, pitch, rosin, turpentine, etc. From rosin an oil was made, termed rosin oil, and this was, by various manipulations known to the manufacturers, converted into lubricating, tanners' and painters' oils. When the Rebellion broke out, all intercourse with North Carolina was suspended, and the stock of rosin became alarmingly low. The discovery of petroleum about this very date was most opportune; and as the various uses to which it could be applied were from time to time indicated and recognized, its value became more apparent every day. As already stated, the senior member of this firm became satisfied at an early day that it possessed most excellent lubricating qualities, and he experimented long and largely upon the crude product of the oil wells, as also upon the refined article. By indomitable perseverance he succeeded in producing an article of the highest degree of perfection as a lubricator, as well as for other uses. In fact, it is surpassed by no animal oils except sperm, which latter is improved by an admixture of some of the firm's fine preparations of petroleum. Under their skilful management their business has increased from a small beginning to large proportions. They have also a preparation of petroleum, which is the most approved cylinder oil now in use and of which they dispose of thousands of barrels annually, which meets with the entire satisfaction of consumers. Like all other successful business houses, this firm have earned their distinction by furnishing the very best oils, and their quality is always up to the standard represented. The firm are also extensive dealers in sperm, lard, whale, castor, olive and other oils.

CHAUNCEY HULBURT was born, August 15th, 1813, in Warsaw, Wyoming county, New York, and is of New England descent, his ancestors having been among the first settlers in America, and of the Puritan faith. His father settled in western New York, while it was a wilderness, and preached the gospel for over seventy years. He died at the advanced age of ninety-four years. His son Chauncey, during early life, removed to western Pennsylvania, and was for many years engaged in a manufacturing business in connection with merchandising; but desiring a more extended field, he repaired to Philadelphia, where he embarked in the wholesale dry goods business, and was most successful in establishing a good line of customers, and so continued until 1860–'61, when the great Rebellion broke out, and, for a time, business of all kinds was prostrated, and ruin seemed to stare every one in the face. At this period petroleum was discovered in inexhaustible quantities in the "oil regions" of Pennsylvania; and his attention being directed thereto, he commenced a series of experiments resulting in the successful manner already described. After a thorough investigation of its usefulness, he adopted the manufacture of machine oils as a permanent business. During the war for the preservation of the Union, he was an ardent supporter of the Government in its efforts to suppress the Rebellion.

ERIE CAR WORKS. W. R. Davenport, President; W. A. Galbraith, Secretary and Treasurer, Erie. This establishment commenced operations in 1868, employing sixty men, and having the capacity of producing one car per day. From time to time the works were enlarged, and now the force of operatives number 500, and the company turn out 3000 cars of all descriptions per annum. This company has recently been organized under the new laws of Pennsylvania, with a capital, limited, of $245,500. The shops are located on an eight acre tract of land, on Cascade street, in the southwestern portion of the city, and are connected with the principal railroads. The iron and wood-working machine shop is 300 feet long and 50 feet wide, and contains some fine machinery, among which may be mentioned a six-spindle drill for arch bars and bunter jaws, 200 of which can be drilled in ten hours by one man with this machine. There are



W. A. Furbush & Son.

MANUFACTURERS OF WOOLEN MACHINERY

also two double-head bolt-cutting and nut-tapping machines, with a capacity of 6000 bolts or nuts per day. In the wood department are two upright wood-boring machines for car works, having four heads, obviating a change of bits. The two erecting shops are each 40 by 112 feet, with room for eight freight cars each. The other shops are of like magnitude, and all the buildings are covered with slate or iron; and as a precaution against fire, the workmen are organized into a very complete fire brigade. Furthermore, to provide against any such emergency as a failure of the city water supply, a number of large wells have been sunk on the premises, provided with pumps and all the necessary appliances, by which the entire works can be flooded in a very few minutes. By the aid of the very superior machinery which the several buildings contain, the company is enabled to produce the cars with the utmost uniformity. Co-operation is practised to a certain extent, thus securing the very best class of workmen, who take a lively interest in the success of the business. The departments of the works are three in number—iron, wood and repairs. At the head of each of these is a foreman thoroughly skilled in the work to be performed, and the President gives personal superintendence to the several divisions. The remarkable success which has attended this establishment—which from a small beginning has been developed in so short a space of time to be the largest enterprise of the kind in the country—is due to the perfect system which governs the whole concern. Everything and every man in his place is the motto of the company; there are no mishaps and no discord, but everything and everybody harmonizes, and all is conducted with the accuracy of clock-work. Another feature connected with the works must be mentioned. The company have erected a three story building, 40 by 150 feet, designed for a boarding house for the single men, and capable of accommodating 100 persons. Here the workmen have all the comforts of a home, without any of the inconveniences or allurements common to ordinary boarding houses, hotels, etc.; the sale of every kind of intoxicating liquors being prohibited near the premises. A reading room, supplied with newspapers and serials, is provided by the company, and the whole is conducted on the principle, that it is to the interest of the corporation to treat their employés well. The company manufacture stock, house and coal cars, beside doing all the repairs of the Empire Freight Line. Adjoining the car works are the extensive

CAR WHEEL AND FOUNDRY WORKS, operated by Davenport, Fairbairn & Co. These works were commenced in the spring of 1866, by the present firm, and their average product was but eight wheels each day. Since that date the establishment has been enlarged eight times, until it has become one of the most extensive in the country, and has now a capacity of turning out nearly four hundred wheels per day, and requires a force of 150 men. The premises are about five acres in extent, one-fifth of which is occupied by the buildings, which are many, and are all built very substantially of brick, and have slate roofs. The foundry contains six cupolas, with an aggregate capacity for melting 150 tons of iron per day; four steam engines, whose collective power is equal to 100 horse, and two large blowers. Two gas wells have been drilled on the premises to a depth of 700 feet, and this natural gas furnishes the fuel for the boilers, for baking cores, as well as for lighting and warming the shops. The firm have recently made important improvements in the cupolas, which enable them to work the iron so as to secure greater strength than heretofore. They are now moulding wheels by a patent process which gives a more uniform chill and a consequent greater average durability. The secret of the success of this firm, which is almost unparalleled in the history of manufactures, lies in the fact, that none but the very best quality of iron is used; and the mixing and working of this iron, and the moulding of the wheels, is conducted under the personal supervision of Mr. Fairbairn (of the firm), an English gentleman of long experience in the business. No work is permitted to leave the shops without having stood the most thorough tests. The wheels are sold throughout all the Northern, Eastern, and Western States. In addition to the wheels, the foundry produces about 3000 tons of car castings per annum.

MERRILL A. FURBUSH & SON, Manufacturers of Wool-working Machinery, Philadelphia, and Camden, New Jersey. Merrill A. Furbush, the founder and senior partner of this firm, was born in Worcester county, Massachusetts, August 7th, 1817. On leaving school he served his time as machinist at North Chelmsford, near Lowell, and afterwards did journey work till 1850, when he commenced business for himself at Worcester. It was at first up-hill work, and when his energy and perseverance were beginning to bring their due success, his establishment, in common with many other machine shops, was destroyed by the large fire which

visited Worcester in 1854. But during the four years he had lived there, M. A. Furbush had become known and respected; and so in this emergency the leading men of the city, bankers and others, who wished to retain the manufacturing interest in Worcester, came to his aid, and helped to obtain premises in which to recommence his business. After this second start he continued with success till 1859, in which year he sold out and removed to Philadelphia. This step he was induced to take by the consideration of the great advantage which Pennsylvania possesses over the New England States in her supplies of coal and iron. In Philadelphia he commenced business on premises at Fifteenth street and Pennsylvania avenue, employing forty hands, and manufacturing during the first year about $25,000 of machinery. For eighteen months the business was conducted solely by himself, and then Daniel T. Gage was admitted as a partner. This partnership, however, did not prove satisfactory, and, after lasting a few years, was dissolved. In 1863, the business of the establishment having so grown as to need more extensive premises, the works were removed to Camden, New Jersey, where the firm had bought an old paper mill. This they almost entirely rebuilt; a foundry was erected, and many other additions made. The site occupied measures over ten acres, and is bounded on the north by Cooper's creek, on which the firm have wharfage. It is on the east side of Twelfth street, and on this street fronts the range of buildings forming the works. Nearest to the creek is the foundry; next the casting room; then the engine house, containing an engine of 150 horse power. Adjoining the engine house are the machine shops—two buildings, separated by a roadway, and connected by bridges from the second and third stories. The frontage of these buildings is over 400 feet. They are flanked on the south by a row of twelve dwelling-houses owned by the firm. Behind are a blacksmiths' shop, a pattern shop, a drying house, and much space for the storage of coal and iron; while in the extreme rear is a lofty lumber shed 360 feet long. Rapid growth has continued to characterize the business, and now 200 hands are constantly employed. Nothing but woolworking machinery is turned out, but of this there is every species necessary for the manufacture of cloth and other woollen fabrics. It comprises wool pickers, every sort of carding machine, "mules," "jacks," and many descriptions of warping apparatus. M. A. Furbush & Son are the only manufacturers of the Murkland Carpet Power Loom, having made an arrangement with the patentee. They themselves also own many patents. $400,000 is now the estimated value of the yearly produce; and from the nature of the enterprise, and judging from past progress, greater results may be predicted for the future. Charles A. Furbush, eldest son of M. A. Furbush, became a partner in 1859.

DUFF & SONS, General Commission Merchants and Manufacturers of Vinegar, Pittsburgh. This business was founded by Peter Duff in 1868. He was at that time, and had been for many years, the proprietor and principal of Duff's Mercantile College. Robert P. Duff, a son, and Edward A. Kitzmiller, a son-in-law, were given an interest in the business, and assumed the practical charge and chief responsibility of the undertaking. Peter Duff died about one year after the formation of the partnership, leaving the junior partners in the sole control of the business. They occupy the whole building at No. 124, and a portion of that at No. 122 Second avenue. The business has prospered from the start, the sales amounting to $90,000 the first year. The special feature of their success is the manufacture of the article known as "No. 20 Vinegar," which has a local reputation unexcelled by any other. This vinegar is manufactured by the most improved methods—one in particular not being used by any other firm, that of filtering—enabling them to guarantee its being standard and uniform in quality from one year to another. They also do a steady and reliable business as general commission merchants, having connections in all parts of the country. Their whole business now amounts to about $250,000 annually—having nearly trebled since the start—and is still increasing. They enjoy a very wide business acquaintance, brought about by the reputation of the founder.

PETER DUFF was born at St. John, New Brunswick, in 1800. He had reached the meridian of life before he removed to Pittsburgh, where he located in 1838. In the same year he founded the celebrated mercantile college bearing his name, which to this day enjoys a world-wide reputation. It was the first institution of the kind established in the United States, and has since found imitators in all the principal cities of the Union. In learning he was not a profound scholar, but his business education was very thorough, and this was the secret of the great success of Duff's Mercantile College. He conducted it up to the date of his death, a period of thirty-one years, and it then passed into the hands of his two eldest sons, who

are at present in charge of it. It is still a flourishing institution, enjoying a patronage from all parts of the Union. In 1868, the principal conceived the idea that an actual business establishment would be a valuable auxiliary to the institution, in that it would give the pupils a better knowledge of the practical workings of trade—that is, would bring them directly into contact with the busy mercantile world, and give them an experience that would never be lost upon them. In this he was not deceived, and the experiment proved eminently successful, for it not only served the purposes designed, but laid the foundation of the business above described. It eventually became separated from the college. It was originally established solely as a commission house, but, through a combination of business circumstances, not necessary here to relate, the firm gradually established themselves as large manufacturers of vinegar. Graduates of the mercantile college are engaged in business all over the Union, and much of the trade of the commission house comes through them—a most flattering compliment to the institution. In 1849, Professor Duff published a work on bookkeeping, entitled, *The North American Accountant*. It was revised and enlarged, to adapt it to every kind of business, a few years before his death. He died in 1869, leaving a large family to mourn an irreparable loss. Besides his great reputation as a commercial tutor, Professor Duff was held in high social esteem in the community in which he had lived and labored for nearly a third of a century.

NEW CASTLE IRON COMPANY, R. W. Cunningham, President; J. M. Arnold, Treasurer; and P. A. Wilbur, Superintendent, New Castle, Lawrence county. These works were erected in 1873, and are located on a tract of land six and a-half acres in extent, in the First Ward of the town of New Castle. The improvements consist of a rolling mill, measuring 140 by 100 feet; a puddling mill, 120 by 60 feet; boiler, lathe room, etc., of 60 by 80 feet; all of these are constructed of wood and have iron roofs. The wareroom and office building is of brick, two stories high, and is in dimensions 41 by 160 feet. The entire establishment is supplied with a fine line of machinery and other appliances, among which may be named 10 boiling, 4 heating and 2 annealing furnaces; 1 24-inch "3 high" plate mill; 1 20-inch "2 high" sheet mill; 1 set of bar rolls; 1 of Ferris & Miles' steam hammers of 25 tons stroke; 1 set of muck shears, with engine; 1 set of heavy plate shears, with engine; 2 sets of heavy trimming shears; 1 Knowles steam pump; 1 Cooper steam pump; 1 ore crusher; 1 pulverizer; 1 roll lathe and 3 steam engines, 1 of 30 horse power and 2 of 300 horse power each. These are supplied with steam from a battery of 8 boilers, each 32 inches in diameter and 28 feet long. The articles manufactured consist exclusively of plate and sheet iron, of which they are now producing 12 tons daily, although they have the capacity of making 20 tons in the same space of time. They use only hammered blooms of the best quality, and the works are unexcelled in the character and grade of their special line of manufacture, and are among the best arranged, most heavily equipped and most successfully conducted in the State. On an average about 100 workmen are employed.

R. W. CUNNINGHAM was born in county Derry, Ireland, January 23d, 1817. His father came to America in 1826, and located in Pittsburgh, where R. W. received his education. He moved to New Castle in 1835, and engaged in mercantile business, and in 1839 established the foundry and machine shop now owned by Cunningham & Co., and which he has run constantly since that period. At the same time he enlarged his former business, and, while the Erie extension of the Pennsylvania Canal was in operation, did a very heavy warehouse and forwarding and commission business. In 1873, he instituted the New Castle Iron Company. He has been and is now connected with several banking, manufacturing and railroad corporations and enterprises. For eighteen years he was a director of the Cleveland & Mahoning Valley Railroad, is now a director in the Lawrence National Bank, of New Castle, in the New Castle & Beaver Valley Railroad, in the Lawrence Railroad and in the New Castle & Franklin Railroad. He resides in New Castle.

P. A. WILBUR, Superintendent, is a native of Plymouth county, Massachusetts. He received his education in Middleboro', and learned the trade of a carriage-maker, working at the same until 1850, when he went to New Castle, Pennsylvania, where he effected an engagement in the works of the Cossalo Iron Company, as pattern-maker and millwright. He remained in that concern for six years. On the formation of the Watson Iron Company, in 1857, he became a partner in the same, and assumed the management of the works. Two years afterwards this company was bought out by the firm of Crawford Brothers; he, however,

continued as manager until 1863, when he became associated in business with R. W. Cunningham, and was manager of their foundry and machine shops until 1865, when he returned to Massachusetts and resided upon his farm for about eight years. In 1873, he went again to New Castle, and superintended the erection of the works of which he is part owner and manager; and it is to his thorough knowledge of machinery, the result of many years of practical experience in the business, that this establishment owes in a great measure its present success.

LAWRENCE FOUNDRY AND MACHINE SHOPS, Shaw, Waddington & Co., Proprietors, New Castle, Lawrence county. These works were commenced in 1848, by the firm of Pearson, McConnell & Co., who designed them for the manufacture of stoves, plows and other small castings, and gave employment to eight hands. Subsequently the establishment passed into the hands of different firms, which never, however, changed its entire membership. The last change occurred in 1872, when the present firm came into possession of the property, the senior partner, Mr. Shaw, having been one of the original proprietors. The works are located on Mercer street near South, and the buildings include a machine shop, three stories high, measuring 50 by 90 feet, and a foundry, 50 feet square, both built of brick. The articles manufactured consist of steam engines, rolling mill castings and machinery, beside doing a general foundry and machine shop business. Twenty men are constantly employed, and the cash value of products is estimated at $30,000 per annum.

J. W. EVANS & CO., Iron and Brass Founders and Machinists, Sharon. In July, 1872, J. W. Evans and Joseph King & Co. commenced the erection of an iron foundry, machine shop, etc., on a lot of ground, one acre in extent, situated on Budd avenue, in the borough of Sharon, Pennsylvania. In August of the following year Joseph King & Co. disposed of their interests in the concern to J. M. Irvine, who now represents the "Co." of the present firm. The establishment embraces a foundry, 60 by 82 feet; a machine shop, 40 by 50 feet; a warehouse, 30 by 60 feet; and office building. The cupola furnace is capable of smelting from six to seven tons at one heat, and there are also three brass furnaces and several core ovens. The machine shop contains a complete outfit of tools and the necessary appliances for the successful production of the various articles manufactured, including the necessary lathes, planers and drill presses, which are operated by a steam engine of twenty-five horse power. The articles produced by this firm are especially hot blast ovens for furnaces, chilled iron harness and centres for nail machines. The value of manufactures is estimated at $80,000 per annum.

J. W. EVANS, senior partner, and manager of these works, was born, December 1st, 1848, in New Castle, Lawrence county, Pennsylvania, and is the son of H. J. Evans, at that time an iron manufacturer in that town. He received his primary education in the schools of his native town, and thence proceeded to the Pearl Street School, in Cleveland, Ohio, to complete it. After leaving the latter institution he went to Sharon, where he served an apprenticeship in learning the trade of a carpenter and joiner, after which he repaired to the private institute of A. Vandernain, in Lake county, Indiana, where he studied civil engineering. Having completed a thorough course of instruction in that important line, he was engaged for two years in the practice of that profession and in the construction of blast furnaces. He then embarked in the foundry business, as above stated, and in which he has met with good success.

SCHOMACKER PIANO FORTE MANUFACTURING COMPANY, Philadelphia. The manufacture of pianos is not a new industry in this country, but it is only within the past twenty years that it has grown to its present proportions. Some of the largest and finest industrial establishments in the principal cities of the United States are now devoted to this manufacture, and the amount of capital engaged in it is fabulous. The largest manufactory of the kind in this State, and one that has a reputation second to none in the country, is that of the Schomacker Company, at Eleventh and Catharine streets, Philadelphia. In 1838, its founder, J. H. Schomacker, a native of Germany, commenced, in a small way, the manufacture of pianos in the above city. He was more than a mere mechanic, and was possessed in a remarkable degree of the inventive genius so characteristic of German skilled labor. Added to his natural ability, he had undergone a rigid appren-

tieeship in his native country. The excellence of his manufactures was soon recognized, and in 1845 they were awarded a silver medal by the Franklin Institute, of Philadelphia. Three years later, after a lively competition with the best makers in the country, the Schomacker piano was again triumphant and bore away the first prize of the American Institute, of New York. It was also successful at the Maryland Institute, in the same year. This was the first exhibition of the institute, and their prizes were eagerly sought for. Further honors awaited the maker of the instrument. At the International Exhibition, held in the Crystal Palaee, New York, in 1853, manufacturers from all parts of the world competed for the first prize. After a critical investigation of the merits of each, it was awarded to the Schomacker. The instrument has been awarded medals innumerable, and this portion of its history may be dismissed with the further statement that it was awarded the only medal at the Franklin Institute, in 1874. In 1855, the fine building at Eleventh and Catharine streets was erected. It is a commodious five story building, admirably adapted to its purposes, and complete in every detail. The most skilled and best paid labor is here employed, and every detail of the manufacture is compassed within its walls. Up to the time of his deeease, J. H. Schomacker gave this manufactory his personal supervision. In 1857, the business received an impetus from the admission of Henry W. Gray, who assumed the management at once. He was eminently fitted for the position, possessing rare business qualifications and great energy, and he proceeded to push the piano into greater prominence. In 1864, he organized the coneern into a stock company, and became its President and business manager. His enterprise did not stop here, for he was determined to make the Schomaeker piano world-famous. At the beginning of President Lincoln's first term, a Schomaeker Grand was seleeted for the White House, and with each sueceeding term until the present day it has been given the preference over all others. The first piano placed there was on exhibition at the warerooms of the eompany for several years, and was an object of mneh curiosity and interest. The piano which took the first prize at the Crystal Palaee, in 1853, is still in the possession of the company. It is an elegant pieee of sculptnred workmanship, carved by the celebrated artist Bailey, and is valued at $3000. Its inner workings have been much improved upon since that day. It is not proposed here to give a minute description of the details of the manufaeture of the piano. It is sufficient to the purpose of this work to say that only skilled labor is employed in the mannfactures of the Schomacker Company, and that many of the workmen have been with them more than a quarter of a century. Also that the lumber used comprises rosewood, maple, ash, walnut, cherry and sprnce, and that all these woods are seasoned through years, and put through various drying proeesses, before they are submitted to the eareful manipulation of the workmen. In every department the most improved machinery and tools are employed. A great nnmber of pianos are turned out of this establishment annually, and their beanty of finish, richness of tone and durability are indorsed by the highest professional and amateur talent as being unsurpassed. They embrace what are known as Concert Grands, Semi-Grands, Parlor Grands and Upright and Square, and embrace all the latest improvements. Besides the manufactory, there are spacious warerooms at 1103 Chestnut street, where the above makes are on hand in all their variety. From here these instruments are shipped to all parts of the civilized world, and the company claim to manufacture a greater number of pianos than all other makers in Philadelphia combined. The annual sales average a little over $200,000. It is creditable to the President of the company that he proposes to be one of the foremost exhibitors at the Centennial.

JOHN HENRY SCHOMACKER was born in the province of Holstein, Germany, January 1st, 1800. After reeeiving an education in the best schools of Germany, he was apprenticed to a cabinet-maker. At the age of twenty-five, his attention was turned to the manufacture of pianos. He sought the requisite knowledge in the leading manufactories of Germany. Finally, he went to Vienna and mastered the business, and then engaged in it on his own account. He was indneed to leave there for the United States, in 1837, and settled in Philadelphia. He at once began his manufaetures, though his progress was slow at first. But the three patents at the Patent Office, at Washington, the certificates of merit and the numerous medals his instruments received, are strong evidence of the earnest efforts he put forth to make the "Schomacker" the leading piano of the present day. He was for many years a member of the German Benevolent Society, and a director of the German Hospital, of this city. He was a prominent member of the Masonic fraternity, and an active worker in those enterprises in which he took an interest. Having been left an orphan in early life, he was compelled to carve his own fortune, and this he did successfully. He died in 1875.

HENRY WOLF GRAY was born, June 3d, 1830, at Ephrata, Lancaster county, Pennsylvania. His father was Justus Gray, a respectable farmer of that county. He was educated at York, Pennsylvania, and on leaving school entered the hardware store of John F. Steinman & Son, at Lancaster. Coming of age, he engaged in the iron and mining business. At the age of twenty-five, he married a daughter of J. H. Schomacker, the manufacturer of the piano bearing his name. In 1857, he came to Philadelphia and assumed the management of his father-in-law's business, for which he was eminently fitted by his energy and rare business qualifications. He steadily pushed it into the prominence it now occupies, and in 1864 formed it into the Schomacker Piano Forte Manufacturing Company, under act of the Legislature, and became its President and business manager. The capital thus obtained enabled him to largely extend the business of the concern and increase its manufactures. The business is now under his sole management, and under his guidance has become one of the most important and successful enterprises of the kind in the United States. Besides being engaged for years in a very active business life, he has until recently been very prominent in State and city politics. He entered into politics at an early age and has held many positions of trust and honor, but has never enriched himself a dollar thereby. He was a member of the gubernatorial convention that nominated Andrew G. Curtin, and was very active in securing the same honor for General John W. Geary, who was his warm personal friend. He was closely connected with the latter administration as the confidential adviser of its executive head. At the outbreak of the war he was appointed an aide on Governor Curtin's staff, with the rank of colonel, and was afterwards transferred to General Haupt's command. He was never fully commissioned, however, as the condition of his business at that time demanded much of his attention. He resigned a seat in Councils to accept the above appointment. In the latter body he was at one time Chairman of the Finance Committee, and was credited with raising more funds for war purposes than any other who ever filled that position. In 1864, he was elected to Select Council, serving one term, and then entered into a spirited contest for the nomination for State Senator from the Third District, but was defeated by A. Wilson Henszey. He was again elected to Common Council a few years later, and in 1871 received the Republican nomination to fill the vacancy occasioned by the death of State Senator Connell, in the Fourth District. His opponent was Colonel A. K. McClure. After an exciting contest, and one that provoked more or less comment from the press all over the country, he was given the certificate of election, and took his seat in the State Senate. Then commenced the famous Gray-McClure contest, which ended in the former losing the position of Senator. The crowning event of his life was his strong and successful advocacy of the location of the Public Buildings at Broad and Market streets, for which he was at the time severely censured by many of the leading citizens of Philadelphia. But the wisdom of his ideas has since become apparent, and a large majority of the popular vote of the city indorsed the acts of himself and his co-laborers. He was at the time a member of the commission appointed to superintend the erection of these buildings, and made a memorable speech in advocacy of their present location, much to the disgust and discontent of many who are now pleased with the success of the scheme. He was one of the first hundred citizens who joined the Union League, of Philadelphia, and has been an active, earnest and self-sacrificing Republican during the whole of his political career. Being bold and fearless in the advocacy of everything he undertakes, he is a man calculated to make very bitter enemies and very warm friends. But possessing, as he does, rare business and social qualities, the latter far outnumber the former. He is now in the prime of life, and is one of the most active and energetic of Philadelphia merchants.

THOMAS CASTOR, Wheelwright, Coach and Car Builder, Frankford, Philadelphia, was born in Oxford township, Philadelphia county, Pennsylvania, October 14th, 1810, his father, John Castor, of German extraction, having been an early settler in that locality. Thomas Castor attended the district school for some time, and subsequently was indentured as an apprentice to Benjamin Shallcross, with whom he served his time, remaining in that establishment between four and five years. Being a most attentive and industrious lad, he became a thorough workman, his chief ambition being to excel in every particular. In the month of March, 1833, he began business on his own account as a wheelwright, coach and car builder, in the same place which he now occupies, and has there been actively engaged ever since. He has an inventive genius, which he has turned to a good and profitable account. In 1852, he patented the "Dumping Wagon," which is now in such general use

throughout the country. He is also the patentee of the "Spiral Stair" for passenger railway cars, enabling the traveller to effect a ready and safe ascent to the roof. He is likewise the inventor and patentee of a one-horse car for passenger railways, so arranged as to dispense with the services of the conductor. A lever in the hands of the driver enables the latter to close the rear door and collect the fare without neglecting or interfering with his business as a driver.

ETNA IRON WORKS, Spang, Chalfant & Co., Proprietors, are located at Etna, five miles above the city of Pittsburgh, on the Allegheny river. The works were founded in the year 1825, by —— Belknap. In 1828, H. S. Spang succeeded to the whole business, which then employed not more than fifty hands. In 1837, the firm became Spang & Co., consisting of C. F. Spang, James McAnley, and Joseph Long. At the end of a year Joseph Long retired, but the style of the firm remained unchanged till 1858, when the present co-partnership—consisting of C. H. Spang, J. W. Chalfant, C. B. Herron, and George A. Chalfant—succeeded. Their business is the manufacture of merchant-bar, nails, boiler-plate, and wrought-iron tubes. They were the first to attempt the manufacture of wrought-iron tubes west of the Allegheny mountains, and they have kept pace with the improvements to the present time. The capacity of the works is about 10,000 tons per annum, and when running at its full capacity the establishment furnishes employment to 350 hands. They enjoy excellent facilities for receiving and shipping, a private track extending from the West Pennsylvania Railroad into their mills, which are less than half a mile distant; and their warehouse, on the corner of Sandusky and Railroad streets, Allegheny City, is so arranged that the cars of three different railroads can be run directly into the building. The company mine their own coal, owning, in connection with Lewis, Bailey, Dalzell & Co., 350 acres of fine coal territory at Hite Station, on the West Pennsylvania Railroad, fourteen miles distant. The company have also a new mill nearly completed, which is equal in capacity to their old one. It is located between their other works and the Allegheny river, and directly beside the West Pennsylvania Railroad. The buildings are constructed entirely of iron and stone, and are among the finest specimens of mechanical architecture to be seen in the United States. They consist of two finishing mills, each 130 by 80 feet in dimensions, with 30 feet ports, and back of these two which are parallel; a muck mill 80 by 200 feet standing at a right angle with them. Back of this again is a building 25 by 160 feet, containing Siemen furnaces, which will be exclusively used in the new establishment, both in puddling and heating. Besides these, they are erecting a tube mill.

LACKAWANNA IRON WORKS are the property of the Lackawanna Iron & Coal Company, and are located at the city of Scranton, Luzerne county. The purchase of the present site of that city was made by several of the members of the present Lackawanna Iron & Coal Company, in July, 1840. The place at that time consisted of five small dwellings, a saw-mill, a grist-mill, cooper shop, and school-house. It has since marvellously increased, and become a great railway centre. The census of 1860 gave it a population of 9223 inhabitants, and in that of 1870, these figures were increased to 35,093. Such is one of the results attending the operations of this great corporation. Their works comprise furnaces, rolling mills and coal mines. The furnaces are five in number. The foundations for the first were laid in September, 1840, and after several ineffectual attempts in 1841, it was finally "blown in" in January, 1842. Other furnaces were subsequently added in 1848, 1852, and 1854. The stacks are 50, 67, and 80 feet in height, and the diameter of the boshes are 18 and 23 feet. They are blown by steam engines made by I. P. Morris & Co., of Philadelphia; two of which have steam cylinders 54 inches in diameter each, with 10 feet stroke of piston, driving two blowing cylinders 86 inches in diameter and 10 feet stroke; two others have steam cylinders 58 inches in diameter, blowing cylinders 93 inches in diameter, all 10 feet stroke; to which has since been added an engine of still larger dimensions to supply the furnace last erected. The aggregate productive capacity of all these furnaces is about 60,000 tons of pig-iron per annum; the actual product for 1872 is given as 39,046 tons. The ore used is the New Jersey magnetic. There are three puddling mills; one of these is 150 by 90 feet, containing 20 furnaces; another 300 by 90 feet, containing 32 furnaces; and the third is 450 by 82 feet, containing 28 furnaces and 3 high-train puddle-rolls—in all, 80 furnaces, with steam boilers over each. The rolling mill buildings were commenced in May, 1844; and it was here that, in July, 1847, the first stationary steam engine was started in the Lackawanna and Wyoming valleys

(from Carbondale to Wilkesbarre is a distance of about thirty-five miles, comprising the greater part of this celebrated anthracite coal field), where now there are nearly 1000 in full operation. This company alone have over 40 stationary steam engines constantly running. The main rolling mill building is 500 feet long and 140 feet in width, with 15 heating furnaces, 6 trains of three-high rolls, 10 steam engines, and 1 seven-ton Nasmyth steam hammer. These mills have a productive capacity of 50,000 tons of finished iron—principally rails—per annum; the figures for 1872 being 40,484 tons, and for 1873, 40,339 tons. Attached to the works are about 7000 acres of coal and timber lands, with 250 tenement houses for workmen. About 120,000 tons of coal are mined annually, nearly all of which is consumed at the works.

J. A. DOUGHERTY'S SONS, Distillers and Rectifiers, Philadelphia. This extensive establishment is located at No. 1134 North Front street, and was founded, in 1849, by John A. Dougherty, Sr., the father of its present proprietors. Many years previous to that date he had embarked in the distilling business, being first located on Spruce street, and afterwards on Shippen street above Third, where he met with excellent success, and became quite extensively engaged. In 1832, he removed to the corner of Second and Poplar streets, and went into the general liquor business, where he continued, occupying the building both as a store and dwelling, until 1856. At this time he removed to an elegant residence on Frankford avenue above Harrison street, which is still occupied by his wife. Previous to this, however, in 1849, he had purchased the site of the present distillery, having an area of 160 by 120 feet, on which he erected the stone building, 80 by 48 feet, and four stories in height, which is still used for the purpose for which it was designed. At that time the capacity of the distillery was 350 bushels of grain in ten hours, which has since been enlarged by the present firm to the extent of 500 bushels daily. The aggregate capacity of the ten fermenters then erected by him was 50,882 gallons, which has also been greatly enlarged. In 1850, his son, Charles A., became a partner in the business, and, in 1852, the eldest son, William H., was also made one of the firm. In 1864, they erected a brick warehouse four stories high, with a basement, and measuring 70 by 43 feet, affording storage for 4000 barrels. On October 21st, 1866, John A. Dougherty, Sr., died, leaving to his sons a permanently established and profitable business. By his last will and testament the property was to remain undivided during the lifetime of his widow, who still survives; and the youngest son, John A., Jr., was also by will constituted a partner with his elder brothers. The business was then, and since has been, carried on under the firm-name and style of J. A. Dougherty's Sons. During the spring and summer of 1867, they erected another four story brick building, with basement, 40 by 78 feet, for the purpose of rectifying fine whiskeys and alcohol; but before its completion a law was passed prohibiting the use of a rectifying establishment within 600 feet of a distillery, and they remodelled it as a bonded warehouse. In 1868, they purchased a lot and building at Nos. 1347 and 1349 Frankford avenue, which they fitted up for rectifying, putting up two column stills, holding 1500 gallons each. During the same year they built another bonded warehouse on the Front street property, adjoining the others, measuring 93 by 33 feet, and again, in the fall of 1869, still another, with an area of 40 by 120 feet. The aggregate capacity of these warehouses is 18,000 barrels. They are heated by means of a sixty horse power boiler of Rogers & Black's patent, and every floor is girded by large connecting steam pipes. The average temperature of these rooms is kept at 80 degrees Fahrenheit throughout the year. The exclusive product of this distillery is pure rye and wheat whiskeys, principally the former, of which, when in constant operation, about 12,000 barrels are manufactured annually. The yearly sales of whiskeys alone are fully up to $400,000, and the monthly receipts from the rectifying and alcohol establishment amount to between $30,000 and $40,000. This distillery has maintained from its very organization the highest reputation for fine whiskeys, and the brand of "Dougherty's Sons" is a sufficient guarantee for the excellence and purity of the article.

JOHN A. DOUGHERTY, Sr., was born, 1788, in the county of Derry, in the north of Ireland. His parents emigrated to this country about 1802, and settled in Owego, New York, where they successfully engaged in the occupation of farming. John A., who was their eldest, and, at that time, their only son, was left to the care and guardianship of his grandmother in Ireland. His early education was that afforded by the common school, and while a youth he was apprenticed to a bread baker. When he had completed the term of his indentures he went to Liverpool, and was engaged as a journeyman baker up to his twenty-fifth year. At this time he emigrated to Halifax, Nova Scotia,

Galaxy Pub. Co. Philada.

and there worked at his trade for a little over a year, and thence removed to Philadelphia. When he landed in the latter city his pecuniary means consisted of eighteen pence English. On the very evening of his arrival he obtained a situation as journeyman baker with William Sherborne, whose daughter, Eliza P., he married about the year 1819. The following year he commenced business as a bread baker on his own account, and continued in that vocation for a considerable time, introducing many features which were then unknown in this country; among others, the use of a wagon in delivering bread at private dwellings. On account of the high duties that were, after a time, placed on Irish malt liquors, he deemed it an excellent opportunity to realize a handsome profit in its manufacture in Philadelphia. He accordingly embarked in the business, as previously related. He was well known, through his long mercantile career, as a man of sterling integrity and strictly honorable in all his business transactions. While engaged in the baking business, he was largely associated with such men as Stephen Girard and Robert Steen, and at a later day with William S. Smith, Hugh Craig, and others, and was most highly esteemed by all who knew him.

CHARLES A. DOUGHERTY, who is the practical distiller and financial manager of the business, was born in Philadelphia, November 4th, 1827. During his early years he was in attendance upon the public school, where he acquired simply the rudiments of an English education. Possessing a decidedly practical and business turn of mind, in compliance with his earnestly expressed desire, he was permitted by his parents to enter the grocery of Charles Bemish, corner of Second and Poplar streets, at twelve years of age. He remained with Mr. Bemish about eighteen months, when he secured a position in the office of Mercer & Brady, cotton brokers, afterwards Mercer & Son, with whom he remained for nearly four years. During this time he felt the need of a more thorough education, and applied himself diligently to study during his leisure hours, attending also a commercial institute. At the expiration of the time mentioned, his father desired his services as a bookkeeper and accountant, which he rendered, and was soon after associated in the business. On the 21st of March, 1852, he was married to Catharine A. Arnold, of Philadelphia, by whom he has had three sons and one daughter, all of whom are living. In April, 1863, suffering somewhat from ill health, and believing that a sea voyage would be beneficial, he took passage on the bark "Tacony," bound for Matanzas, expecting on his return voyage to stop for some months in Cuba. But on the 11th of June, when off southeast from Cape Henlopen, they were captured by a Confederate privateer. He was, however, soon released, and returned home. Charles A. Dougherty is a thorough business man, and has been a prominent member of the Commercial Exchange of Philadelphia since its organization. His brothers, W. H. and J. A., have charge of the refining and alcohol establishment.

WILLIAM H. DOUGHERTY, the eldest son, was born in Spruce street, Philadelphia, June 17th, 1825. His early education was received in the private schools of the city, where he became thoroughly familiar with the various English branches of education. He then entered the classical school of that highly accomplished scholar, Rev. Samuel Gayley, at Wilmington, Delaware, where he remained for three years. His father was then carrying on the business of distilling in that city, and upon the full completion of his educational course, he there filled the position of book-keeper in the distillery till 1847. During this time he had acquired a knowledge of telegraphy, and he engaged in that service as an operator, in Baltimore, Maryland; but for a brief period, however, when he attained the position of Assistant Superintendent of the Bain Chemical Telegraph Line, extending from Baltimore to Washington. This office he held, really attending to the entire duties of the General Superintendent, till 1851, when he resigned his position, and entered into co-partnership with his father and brother Charles. In 1859, he embarked for California, was wrecked on the shoals near the Bahama Islands, but was shortly rescued, and completed the voyage. He intended to make only a brief visit; but shortly after his arrival he was induced to join a party to engage in prospecting for silver ores. Possessing all the requisite knowledge of chemistry, he accompanied them, filling the office of assayer. They prospected for a distance of upwards of 100 miles on the eastern slope of the Sierra Nevadas. He returned to Philadelphia in 1861, and again participated actively in the business. On the 28th of March, 1863, he was married to Harriet Shee, the eldest daughter of Bartles Shee, of Philadelphia, who has borne him two boys and two girls, still living.

J. A. DOUGHERTY was born in Philadelphia, on the 27th of March, 1833. He was placed under educational instruction in the public schools of the city, where he remained until the age of fifteen. Having at this time fully completed his preparatory

course, he entered St. Mary's College, at Wilmington, Delaware, where he pursued his studies with great interest, reflecting upon himself the credit of being an apt and thorough student, and from which institution he was graduated, with honor, in 1851. On his return to Philadelphia he was employed in his father's store, on the corner of Second and Poplar streets, as book-keeper and salesman, holding this position for about five years. At this period, owing to the dulness of trade, he took charge of his father's farm, lying on the Delaware river, some twelve miles above Philadelphia, in the county of Bucks. On the 4th of February, 1862, he was married to Mary Amanda Kale, the eldest daughter of the extensive and well-known tobacconist of Northern Liberties, William H. Kale. He remained on the farm till the death of his father occurred, when, in accordance with the provisions of the will, he entered actively in the business as junior partner.

VESUVIUS IRON WORKS, Lewis, Bailey, Dalzell & Co., Proprietors, are located at Sharpsburg, on the Allegheny river, five miles above the city of Pittsburgh. The original firm, consisting of George Lewis, James O'Hara, and J. C. Lewis, was organized, under the name of Lewis, O'Hara & Lewis, in 1845, and began operations in 1846. In the following year Mr. O'Hara withdrew, and Robert Dalzell took his place in the firm, the style of which became Lewis, Dalzell & Co. The premises embrace thirteen acres of land lying along the Allegheny river, and traversed by the West Pennsylvania Railroad, from which side tracks extend directly into the mills, affording the greatest facilities for receiving and shipping. Starting with eight puddling furnaces and two sets of rolls, the capacity of the works has been steadily increased till at present they employ twenty-four puddling furnaces, ten heating furnaces, six trains of rolls, and fifty nail machines. The coal used at these works is taken from the company's own mine at Hite Station, thirteen miles distant, on the West Pennsylvania Railroad, where, in connection with Spang, Chalfrant & Co., they own 350 acres of coal territory. The articles manufactured are merchant-bar, sheet and hoop iron and nails. The company also make their own kegs. The works furnish employment to 375 hands, exclusive of the coal miners, and the value of the annual production reaches $900,000. The company have a warehouse of their own, on the corner of Anderson and Railroad streets, in Allegheny City, into which cars are run directly from the works without breaking bulk, a convenience rarely to be met with even in Pittsburgh, where exceptional facilities exist for shipping. George Lewis died in 1863, and the firm then became Lewis, Bailey, Dalzell & Co., by the admission of J. E. B. Dalzell, L. W. Lewis, and Arthur D. Bailey to the partnership.

DUNBAR FURNACE, owned by the Dunbar Iron Company, of which E. C. Pechin, of Pittsburgh, is President, is located in the town of Dunbar, Fayette county, and has been in operation for several years. The stack is 58 feet high, and the diameter of the bosh 15½ feet. The ores reduced are Lake Superior and native carbonates. The average annual capacity is placed at 12,000 tons; the product in 1872 being 11,227 tons. The yield for the year ending October 6th, 1873, was 10,701 tons, and of this only 27 tons were white and 63 tons mottled, made after two stops of several days' duration. The ores charged averaged 47 per cent. The President of this company has given great attention to advancing the quality of the products of the furnace, as well as to the latest improvements in blast-furnace economy, and is well known to the iron trade for his enterprise and ability.

SABLE IRON WORKS, Zug & Co., Proprietors, Pittsburgh. This is one of the best arranged mills in the country, and has every facility for economical working; having, among other improvements in operation at their new puddle department, a peculiar mechanism, which is, to some extent, automatic. The purpose of the arrangement is to dispose of the puddle bars as they leave the rolls. First, as the bar comes from the rolls it is discharged on a line of rollers opposite the finishing groove, over which it is taken to a scale midway between rolls and shears. While still on the rollers it is detained long enough to be weighed, after which it is pushed to the shears, cut into lengths, whence the pieces fall into an iron basket occupying a pit of water. This basket, suspended from a beam overhead, is raised to such a height that it runs by its own gravity to the other end, where it comes in contact with an object that unlatches and lets fall the bottom of the basket, and the iron is deposited on the ground ready for piling for the various furnaces. The striking of the object which

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A. R. Sammel

opens the bottom also reverses its direction, and sends it back on the now falling beam to the pit, with the bottom again secure for reloading. In brief, the puddle iron, with the aid of this mechanism, after it leaves the rolls is "dragged out," weighed, cut, and laid aside by one man, who handles the product of sixteen furnaces. The invention is that of the senior member of the firm. The articles manufactured are bar and merchant iron and nails, and the capacity of the works is about 10,000 tons per annum.

KEYSTONE GLASS WORKS, William H. and John B. Samuel, Proprietors, Philadelphia. This establishment is located at the corner of Oxford and Howard streets, and was founded by Adam R. Samuel, father of the present proprietors, in 1862. Some three years previous to his acquiring possession of this location, he had commenced the manufacture of fruit jars in one of the furnaces of the Kensington Glass Works, on an available capital of twenty dollars. Though in his new enterprise he labored under many disadvantages, yet by steady perseverance and indomitable energy he overcame all obstacles, and his hope of success was fully realized. On February 22d, 1863, he commenced operations at the present site with a force of fifty hands. During the following year he erected a two-and-a-half story brick building 66 by 117 feet. In 1865, he added a three story brick edifice, with a basement, 25 by 117 feet; and, in 1867, he erected another of the same height, 33 by 100 feet, to which has since been added the office building, covering an area of 18 by 40 feet. He was the pioneer in the manufacture of fruit jars, of which he made a specialty, and his trade extended throughout the entire country. His operations were greatly facilitated by the Keystone Grinding Machine, which was patented, in 1869, by his son, John B. Samuel, and which is capable of grinding forty-four jars per minute, of three different sizes. In 1859, the yearly product of his factory was about 2500 gross of jars, which increased during the later years to upwards of 40,000 gross. There are generally employed in the factory about 130 hands, both men and boys. Immediately after his death, which occurred February 24th, 1873, his two sons formed a co-partnership, assumed the contracts of their father, as they deemed themselves in honor bound to do, and are now energetically prosecuting the business of the Keystone Glass Works.

ADAM R. SAMUEL, the founder of the Keystone Glass Works, was born, September, 1819, in Wales. In his early boyhood he was unavoidably deprived of educational advantages, and while a mere lad was placed in a nail factory, where he passed the major portion of his time until he was thirteen years old. Then his parents removed with him to this country. His father was by occupation an iron master and builder, and soon after his arrival he contracted to build the celebrated Antietam Iron Works; and in their erection his son Adam was employed under his special direction and instruction. Directly after the completion of these works, the latter entered the Dyottville Glass Works, Kensington, as an apprentice, where he diligently applied himself, not only to his daily tasks, but to obtain a thorough knowledge and a complete mastery of the art of glass manufacture in all its details. He remained here until 1839, when inducements were offered him to enter the employ of Fisher, Morgan & Co., iron manufacturers, at Duncannon, Perry county, Pennsylvania, which he accepted, and at once repaired thither to enter their service. He remained there uninterruptedly for nine years, studiously availing himself of the opportunity afforded him to become thoroughly conversant with the various branches of iron manufacture. In 1848, he returned to Philadelphia, and again engaged his services in a glass manufactory, remaining thus employed until the spring of 1851, when he was called to take charge of an iron furnace belonging to Hon. Andrew Curtin, at Hecla, Centre county, Pennsylvania. Of this he continued the manager until the spring of 1856, when he received a highly advantageous offer from Sheets & Duffy, of the Kensington Glass Works, which once more attracted him to Philadelphia. The dawn of 1857 brought not only a general depression of business to the commercial world, but to the glass manufacturers of Philadelphia the additional calamity of a strike among the operatives, which resulted in a suspension of business, and a dissolution of his connection with the firm by whom he was employed. He now found it impossible to obtain lucrative employment, and accordingly set out as a vendor of glass lamps to the trade. He pursued this business energetically, until he started the manufacture of fruit jars in 1859, as already detailed. Though deprived in his earlier years of the advantages of schooling, his leisure hours were passed in a careful and diligent study of the various branches of an English education. He was a man of large mental endowments, and was conversant with all matters of public interest. He studiously avoided holding any public office, though warmly solicited, at various times, to

permit his name to be put in nomination for State Senator, and other offices of honor and trust. He was through life a man of unimpeachable integrity, indomitable energy, and persevering industry, which he maintained to the last, attending personally to the financial management of his business, although he was for some time entirely unfitted by sickness for so much work, and this he continued to within a fortnight of his death. With his many other acquirements, he ranked high as a vocalist, and was for many years the leader of a quartette club, which was regarded as among the finest in the State. He was a prominent member of the Masonic fraternity, and also of St. John's Commandery of Knights Templar, and his funeral was in accordance with its solemn and impressive ritual. He was married, in 1840, to Catharine Boden, of Cumberland county, Pennsylvania, and seven children blessed their union. He died February 24th, 1873.

WILLIAM H. SAMUEL, the eldest son and senior partner, was born, February 18th, 1845, in Duncannon, Perry county, Pennsylvania. He has received a good English education, and spent two years in one of the high schools of Philadelphia. He began his labors in the factory with his father in the spring of 1859, of which he had the general superintendency up to the time of his father's death.

JOHN B. SAMUEL was born in Philadelphia, on the 13th day of April, 1850. At an early age, he was placed in one of the city grammar schools, where he continued to receive educational instruction till 1863, at which time he entered the factory, where he continued, latterly acting as his brother's assistant. Both are young men of good acquirements and business capacity, educated to habits of industry, and thoroughly familiar with the business.

FRANKSTOWN GLASS WORKS, William Frank & Sons, Proprietors, Pittsburgh, were established by E. Wormser and William Frank, in 1854. The original factory, 66 by 62 feet, was located upon the site of the present works, on the Monongahela river, at Second avenue. It was put into operation with a capital of $10,000, for the manufacture of green and amber glassware for druggists and liquor dealers. It contained one furnace, which annually consumed 70,000 bushels of coal, while in the production of 100 gross per day the works required 5000 bushels of lime, 1200 tons of sand, 300 tons of soda and 300 tons of straw for packing, with about $12,000 worth of packages per annum. The firm employed about sixty hands, whose aggregate payroll amounted to $25,000 per annum. The firm of Wormser & Frank was dissolved March 1st, 1866, by the withdrawal of E. Wormser; and William Frank then associated with him his two sons, Himan and Samuel, under the present firm-name. The capacity of the works having been increased to about 150 gross per day, in 1873, a new factory was erected, into which was introduced the new gas furnace patented by Himan Frank. The production was thus increased to 300 gross per day, and the consumption was proportionately raised to 100,000 bushels of coal, 10,000 bushels of lime, 2400 tons of sand, 600 tons of soda, 600 tons of straw for packing and $24,000 worth of packages per annum. The works were entirely destroyed by fire, June 11th, 1874, and the firm sustained a loss of $80.000, partially covered by insurance; but such a catastrophe could not dampen the energy of these men, and upon the ruins rose a handsome new structure, 70 by 70 feet, which, in ten weeks from the time of the fire, was in full operation. By the use of the improved gas furnace invented by Himan Frank they are enabled to save from $30 to $33 per day in the consumption of coal and soda, without diminishing the amount of production. For the partial accommodation of their 120 hands, employed at an annual expense of about $85,000, they have some seventeen houses upon their property, which covers about three acres of ground, the works being probably among the best arranged and most complete in the country.

WILLIAM FRANK was born in Bavaria, April 16th, 1819. Upon attaining his majority, in 1840, he came to the United States, and after a time spent in Ohio he settled in Pittsburgh, in 1846, and engaged in the dry goods business, which, though he entered upon the present enterprise in 1854, he continued until 1860, when he devoted himself mainly to the manufacture of glassware. From 1864 to 1866 he was a member of the firm of Wormser, Myers & Co., operating in oil, but in 1866 he sold his whole interest therein to E. Wormser. His integrity and business capacity have in great measure contributed to the marked success that has attended the operations of these works.

HIMAN FRANK was born at Jefferson, Ohio, August 27th, 1845, and in 1846 was taken by his parents to Pittsburgh, where he was reared and

educated. After leaving school he was engaged in mercantile pursuits until he entered the present firm. He is the inventor and patentee of the furnace which bears his name, the patent of which is owned by the firm of William Frank & Sons, the late Samuel M. Kier having also an interest. He is now engaged in erecting them in various parts of the country. He is a member of the City Councils of Pittsburgh and an enterprising and useful citizen.

SAMUEL FRANK was born in Pittsburgh, June 2d, 1848. He was educated in his native city, and in 1864 became the out-door salesman for the extensive works of which he is now one of the proprietors. In January, 1874, he associated with others in forming a stock company for the establishment of the Duquesne Glass Manufacturing Company, of which he subsequently became President, in which capacity he not only has a general supervision of the works, but is engaged in the sale of the products of both the large works with which he is connected.

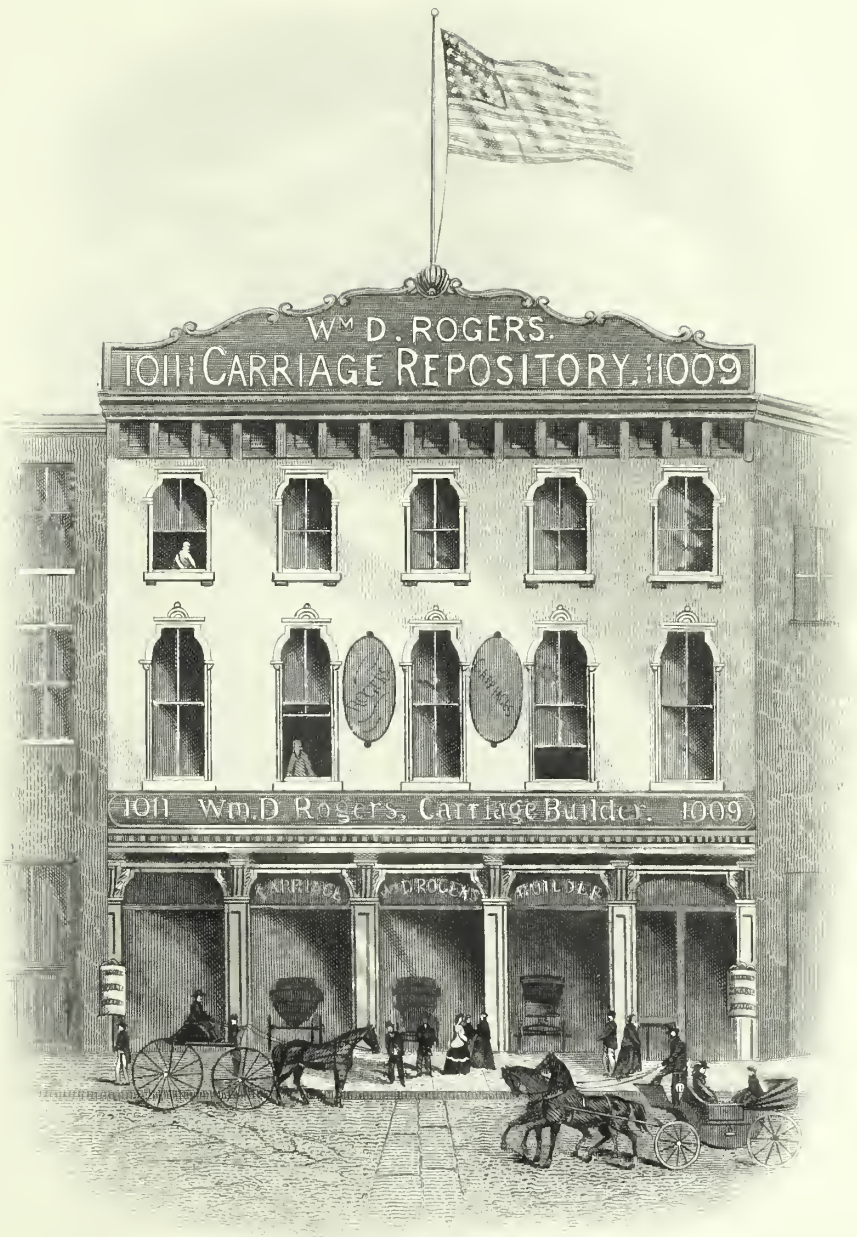
DUQUESNE GLASS MANUFACTURING COMPANY, located on Bluff street, Pittsburgh, was established in January, 1874, on the premises for some five years previously occupied by Reddick & Co. as a glass manufactory. The founders, comprising S. Frank, of the firm of William Frank & Sons, the Excelsior Flint Glass Company, Alexander M. Hamilton, of William H. Hamilton & Co., and others, resolved themselves into a joint stock company, with a paid-up capital of $20,000. S. Frank became President of the corporation, and James H. McCloy, Treasurer. The works comprise several buildings, the main structure being about 50 by 80 feet, running a ten-pot furnace, and the whole occupies about three acres. They employ about 125 hands, with a monthly pay-roll of $6000, and manufacture exclusively lamp chimneys, of which they produce 500 gross per week.

THOMAS IRON WORKS, Thomas Iron Company, Proprietors. These works are located at Hokendauqua, on the Lehigh Valley Railroad, in Lehigh county, and were established by David Thomas, who superintended the building of the first crane furnace, and are now conducted by his sons. The furnaces are six in number, the height of the stacks being 55 and 60 feet; while the diameter of the boshes are 18 and 20 feet, and their average annual capacity is 65,000 tons. The product in 1872 was 41,249 tons. The two blowing engines, at the time they were furnished, were the heaviest ever constructed for the purpose, and a third has since been added. They are all of the lever-beam condensing kind, and were built at the Port Richmond Iron Works, by I. P. Morris & Co. The description of one suffices for all. The steam cylinder is 66 inches in diameter, with 10 feet stroke; the blowing cylinder is 108 inches in diameter and also 10 feet stroke of piston; 2 fly-wheels, each 27 feet in diameter. The beam, which weighs about 40 tons, is supported on a cast-iron column, 33 feet high. The engine is calculated to give a blast of 12 pounds per square inch. The success of these works has been due to the careful management of Mr. Thomas, who brought to this country a valuable experience of blast furnace management in Wales, which he improved by years of practical study here, and the knowledge of which he has imparted to his sons, who have succeeded him. This company also own the

LOCKRIDGE IRON WORKS, which are located at Alburtis, Lehigh county. There are two furnaces; the height of each stack is 54 feet, and the diameter of the boshes 15 feet. The ores used are the hematite and the magnetic. The average annual capacity is stated at 25,000 tons; and the product during 1872 was 24,942 tons.

GLENDON IRON WORKS are the property of the Glendon Iron Company, of Easton. The furnaces are located at Glendon, Northampton county, and are five in number. The first furnace was erected in 1844, and the others from time to time added; several of them have also been rebuilt. The heights of the stacks are 47, 50 and 72 feet; and the diameters of the boshes are 14, 16 and 18 feet. The ores employed are the hematite and magnetic, and 100,000 tons of these are annually consumed, requiring for their reduction 85,000 tons of coal and 50,000 tons of limestone. The average annual yield so far is estimated at 65,000 tons of pig metal. The owners are chiefly Boston capitalists; and, under the management of William Firmstone, the products have always commanded a price somewhat above the market, and are principally sold in New England. Four hundred and fifty men are constantly employed, and the pay-roll amounts to $600,000 yearly.

WILLIAM D. ROGERS' CARRIAGE REPOSITORY AND FACTORY, Philadelphia. Nearly thirty years ago, in the year 1846, the proprietor of this establishment began business on his own account, in a small building—part of the Girard Estate—on the corner of Sixth and Brown streets. He was only a young man, but possessed a thorough knowledge of his trade. During the first year he employed ten hands, and two years later this number had increased to fifty. Under his good management, and by untiring industry on his own part, business grew apace, and such temporary improvements as the precarious tenure of the lease would justify were added from time to time, to meet the growing demand, until, in 1853, he built the factory at Sixth and Master streets. It covered a space of 172 by 137 feet, was four stories high, thoroughly fitted up with every modern appliance, and at the time was regarded as the model coach factory of America. Up to this period his office and salesrooms had been at his factory; but, for the better accommodation of his down-town trade and to reach transient custom, he decided to fit up and open a salesroom and repository on Chestnut street. This was accomplished in 1857, and the present magnificent bazaar, Nos. 1009 and 1011 Chestnut street, is the result. A few years later it was found of the highest importance to connect the factory with the offices and repository, so that all ordered work could be done under his direct supervision, his business having by this time grown largely into a custom trade. Accordingly, in 1860, the rear portion of the repository was rebuilt and fitted up for workshops. His career had been a most prosperous one, and his vehicles had been sought for not only by the citizens of this and other States, but France, England, Germany, Italy and Switzerland had become familiar with his name. But the day of adversity came; for at the outbreak of the great rebellion, in 1861, he lost heavily through filling large orders from the South. He met misfortune bravely, and immediately arranged for the unreserved sale of all his real and personal estate. His creditors, sixty in number, gave him a written and unconditional release; and many of his friends, more fortunate than himself, came forward with offers of pecuniary help. He, however, declined these kindly propositions, and bravely began the world for the second time. When the auction sale took place, in order that the contents of the factory might not be sacrificed, a creditors' fund was established, and most of the unfinished work, tools and appliances were bought in; and he pledged himself to work for the fund, at a salary, for six months. At the end of that period the stockholders received 70½ per cent. on their investment. They then transferred the tools, machinery and unfinished work yet remaining to him, with the understanding that payment for the same was to be made at his own time and convenience. With this property and $285 cash capital, he went to work again with renewed hope and energy. Prostrated by the first shock of disaster, and for some time confined to his bed by illness, he put forth all his energies, fully discharged his obligations (over $60,000), completely re-established his business, repaired his broken fortunes, and his standing in the mercantile community became higher than before. Having suffered from the credit, he changed his policy to the cash system. In 1865, he added to his workshop a large four story brick building, on Filbert street, where the rough lumber is stored and seasoned, and which also serves as a workshop for the wood-work and heavy forging. A very heavy stock of lumber is required to be kept constantly on hand, as the seasoning requires not months, but years; and all lumber for first-class work, which is the only class manufactured at this establishment, needs from two to five years to perfect it. The woods used for bodies are ash, cherry and poplar; for the wheels and running gear, hickory. The iron used in the smith shop, where the heavier class of carriages are ironed, as well as in all the smith shops of the establishment, is of Norway, Ulster and Lowmoor brands, experience having demonstrated these to be the best adapted to this branch of manufacture. In the manufacture of the wheel, every attention is paid to the production of a first-class article; and so very particular is the proprietor in this respect that one and the same man has driven every spoke that has been used in the factory for nearly twenty-five years, which of itself is a sufficient recommendation. All the leather used for trimming the carriages is made expressly for the establishment; while the cloths, silks, carpets, etc., are for the most part imported. All the work is done by hand. An amusing incident is related in connection with a light buggy shipped to an American Consul in Switzerland, several years ago. The astonished natives looked at it with curious interest, and predicted that its skeleton frame-work would be jolted to pieces on the mountain roads of the Swiss Alps. The purchaser was absent when the vehicle arrived, and his servant (he must have been a Yankee) charged an admission fee to those desiring to inspect it. His enterprise brought him a considerable sum in money—more than he would have earned in six months! In 1870, the proprietor leased the factory


Wm D. ROGERS.
1011 CARRIAGE REPOSITORY. 1009
1011 Wm.D Rogers, Carriage Builder. 1009

Wm. D. Rogers & Co's Carriage Manufactory Philadelphia

Wm. D. Rogers

formerly in the occupancy of George W. Watson & Co., in the same business; and in 1871 took into partnership Joseph Moore, Jr., and thoroughly reorganized its various departments, to fulfil the growing demands of the trade. The great success which has attended the proprietor of this manufactory may be ascribed to his early determination to secure excellence in detail. This plan was adopted and strictly adhered to. He has never catered for a "cheap" class of work; and his patrons are among that class of economists who understand that a higher price paid for an article at the outset will secure for them a first-class article, which will prove the cheapest in the long run and will save them many times the additional amount in interest and repairs. A few words will serve to explain the secret of success of this house. Striving not so much to exceed in the volume as to excel in the quality of the work produced; desiring not so much the number of patrons as their selection, it has acquired a reputation and consequent success, which life is too short to lose.

WILLIAM D. ROGERS was born, July 16th, 1819, at Baltimore, Maryland. At the age of fifteen he was regularly indentured, in Philadelphia, to the carriage building business. After his apprenticeship had expired he began to travel, with a view to perfecting himself in his business and to obtaining a thorough knowledge of the wants of the trade in all parts of the New World. He worked as a mechanic, under the most skilful builders, in various cities and towns of New England, the Southern States, Canada and the West Indies. His pet idea had always been to start a first-class coach manufactory in Philadelphia. Returning to that city, therefore, with the stock of knowledge he had obtained in travel, which was probably greater than that of any young mechanic in the business at that day, he invested his little savings in carriage building of the finer class. He now found use for the knowledge he had gained, and was able to speak advisedly on everything connected with his business, North, South, East and West. Connoisseurs soon began to appreciate this, and the very best patronage of the country became his. Added to his natural ability as a mechanic, he was a very tasteful designer, and made his manufactures in this respect an example to be followed by others. His great success was not achieved without a hard struggle, but it was worth all he had endured to achieve it. His honorable ambition has ever been, not to equal, but to excel in everything connected with his manufactures, and his business rivalry has always been characterized by a generosity that has won the admiration of his fellow-manufacturers. Among carriage-builders he is very popular, from his accommodating disposition and the kindly interest he takes in everything looking to the establishing of a fellowship among them. He is so far in advance of most of them, and is so continually putting something new and tasteful into the market, that they look upon him more as a conservator of the art in their business than as a formidable competitor. But one in each trade, art, or profession can excel, and it is generally conceded that William D. Rogers has succeeded in reaching the top round of the ladder in his. He has made his business world-famous, and has become an authority upon all matters connected with the finer class of carriage building. In personal appearance, he is about the medium height, with a well-built frame, whose roundness is well preserved in spite of the severe tax to which it has been subjected during the many years of his very active business life. In his face there is a record of no vices, but it is characterized by a geniality and frankness of expression that wins upon friend and stranger alike, and puts them perfectly at ease in his company. In his intercourse with his workmen, he so conducts himself as to secure their confidence; and some of his fellow-workmen are now in his employ, while those who have served an apprenticeship in his establishment are anxious to continue as journeymen in the same.

FREEDOM IRON COMPANY. This association dates its organization from the year 1856, when it purchased the property of John A. Wright & Co., and under the direction of the senior partner, who became also the president of the corporation, entered upon the manufacture of railway axles, bars for machinery uses and locomotive tires. The works are located about three miles from Lewistown, Mifflin county. The first iron works at this place were built in 1811, to use the Greenwood ore, an hydrated oxide of iron, generally termed pipe ore. The iron made from this ore was highly celebrated, and gave the first distinctive title of "Juniata" to iron from this region. In 1847, the works, with the Greenwood Furnace, came into the possession of the firm of John A. Wright & Co., under whose ownership they were largely increased; making for years the celebrated Spring Wire Blooms, produced by the admixture of the Greenwood ore with a peculiar fossil ore found

near their furnace in Huntingdon county. The Freedom Iron Company, since its occupancy of the works, has been singularly successful in producing locomotive tires, and the establishment was the first in the United States to attain the honor of producing them not only equal, but superior to any of foreign manufacture; at least, this is the testimony of the superintendents and master mechanics of the leading railroad companies of America, demonstrating the fact that this country not only possesses the material, but the skill to produce whatever can be desired. The processes adopted by this company in fabricating these tires include five successive forgings, under large steam hammers, before the straight tire bar is produced, which is afterwards heated and bent by machinery into a hoop; the ends are next welded, and the hoop again heated and rolled for the first and only time, by heavy and costly machinery, to its true dimensions and finish. The works now consist of three charcoal furnaces and two large forges, with about 40,000 acres of land, and all the necessary buildings incident to the business carried on.

POTTSTOWN IRON WORKS, Pottstown Iron Company, Proprietors. Charles L. Bailey, Treasurer and Manager. This company was organized in January, 1864, at Pottstown, Montgomery county, where the works are also located. They are devoted to the manufacture of plate-iron, of which the amount of 12,000 tons has been the average annual product; and so successful have been the results that recently the works have been considerably increased. The first general manager and treasurer was Edward Bailey, who retained that position until December, 1868, when he was succeeded by his brother, Charles L. Bailey, who continues to perform those responsible duties.

EDWARD BAILEY, the first manager and treasurer of these works, was born, May 15th, 1825, in Chester county, Pennsylvania, and was educated at the West-town school, and on leaving this institution became a clerk in a country store, near the Catskill Mountain House, New York State, where he remained two years, and then returned home to Chester county. In 1850, he joined his father and brothers in the business of manufacturing iron plates, which they were carrying on in Berks county, at the Pine Iron Works, under the name of Joseph Bailey & Sons, and remained in that concern until the spring of 1857. He then removed to Pottstown, entering into partnership with H. Potts & Co.; the name of the firm became Potts & Bailey. After continuing in this house five years, he disposed of his interest in the establishment to the other partners, and joined the firm of E. G. Brooke & Co., engaged in the manufacture of nails. This partnership, however, lasted only eighteen months, and at the expiration of that time he again sold out his interest to the other partners. He returned, in 1864, to Pottstown and established the firm of E. Bailey & Co., and was chosen in the same year Manager of the Pottstown Iron Company, in which he is largely interested, a position he retained until December, 1868, when he resigned. He was then absent for about one year, but on his return resumed an active share in the business. In the various positions he has occupied during his busy life, his energy and business ability have been remarkable, contributing essentially to the success of every enterprise with which he has been connected. He has evinced much interest in the growth of Pottstown, and has erected there some thirty or forty houses, adding much in this manner, as well as by his general business transactions, to the welfare of the borough.

CHARLES L. BAILEY, the present Manager of the Pottstown Iron Works, and treasurer of the company, was born, March 9th, 1821, in Chester county, Pennsylvania, and, like his brother, was educated at the West-town school, and on leaving school entered Evans & Co.'s drug store, Philadelphia, as clerk, where he remained until eighteen years old. He then joined his father, who was engaged in the iron business at Coatesville, Chester county, acting as clerk. In 1844, his father's business at that place terminated, and in 1845 he removed with him to the Pine Iron Works, Berks county, where he became a partner, the name of the firm being Joseph Bailey & Sons. In 1852, he left his father, and in 1852–'53 commenced, in connection with his brother, Dr. George Bailey, the erection of the Central Iron Works, at Harrisburg. While there he entered into partnership with the late James McCormick, in the business of manufacturing nails, at the Harrisburg Nail Works, and under his skilful management the mill proved a financial success. This association lasted until 1866, when his interests in both branches of the business were closed out. In 1867, in connection with his brother, Dr. Bailey, he built the Chesapeake Nail Works, at Harrisburg, which soon proved very successful. He still retains an interest in these works. In 1869, he removed to Pottstown,

to take charge of the Pottstown Iron Company. He has constantly shown himself to be a man thoroughly imbued with the spirit of progress and enterprise, as may be seen by the numerous industrial undertakings in which he has been engaged, or which he has initiated, and which have largely contributed to the interests of his native State, and placed him in the prominent position he now occupies. He is highly esteemed by his fellow-citizens for his general character and the great business ability evinced in his able management of the two important companies under his control.

CATASAUQUA MANUFACTURING COMPANY: President, Samuel Thomas; Superintendent, Oliver Williams; Lehigh county. This company are the owners and proprietors of three separate and distinct establishments, which they have erected or acquired from time to time. These are the Catasauqua Iron Works and the Ferndale Mills, both of which are located in the borough of Catasauqua, on the line of the Lehigh Valley Railroad; and the Hope Rolling Mill, which is at Allentown, the shire town, this last being used as a muck mill. The mills at Catasauqua manufacture bar, rod, plate and sheet-iron to the amount of 20,000 tons per annum, the products being varied and of special quality. Constant improvements are being made in all the works belonging to the company. During 1873, there was added to the machinery in the Ferndale Mill a six-ton steam hammer, with the capacity of thirty-one tons in force of blow struck. A train of 21-inch rolls has also recently been added to this mill.

CENTRAL IRON WORKS, Harrisburg, Pennsylvania: Dr. George Bailey, Treasurer and Superintendent. This establishment was built in 1852–'53, by Charles L. and Dr. George Bailey, and was the first mill erected in Harrisburg for the rolling of plates. When the works commenced operations, they contained but two heating furnaces, to which additions have been made from time to time. The productions increased gradually from the beginning of the enterprise, and in 1866 a corporation was formed, of which Dr. George Bailey is Treasurer, with a capital of $120,000. The present site occupies about two and a-half acres of ground, and is located on the south side of Herr and Seven-and-a-half streets. The tracks of the Pennsylvania Railroad run along the west side of the mill, while the Pennsylvania Canal flanks it on the east side, thus affording the best possible transportation facilities for the receipt of material or the shipment of products. The building measures 120 by 99 feet, and contains four boiling or puddling furnaces; two heating furnaces; a large trip-hammer—which strikes a blow equal to two tons—for welding blooms for fire-boxes; and one train of rolls, 20¼ inches in diameter, which is capable of making a plate 2 inches thick. The machinery is driven by three steam engines, whose aggregate power equals 200 horses. The specialty here is the manufacture of boiler and tank iron, and particular attention is paid to the preparation of the higher grades of boiler iron, such as locomotive, fire-box and flange iron, all of which is well hammered. The annual product of the works is about 4000 tons of boiler plates and 2500 tons of puddle blooms; their average value is about $350,000 yearly. The principal markets for their manufactured iron are found in New York city and State, Pittsburgh, Chicago and the Southern and Western States. About sixty hands are constantly employed.

CHESAPEAKE NAIL WORKS, Bailey & Brother, Proprietors, Harrisburg. These extensive works, owned and operated by Charles L. and Dr. George Bailey, constituting the firm of Bailey & Brother, were founded by the present proprietors, in 1866, and originated from their former manufacturing interests in Cumberland county, where, in connection with James McCormick, they carried on extensive nail works. The Chesapeake Nail Works were commenced on a considerable scale, and their capacity has since been nearly doubled. The buildings, including dwelling houses for the operatives, cover about eight acres of the seventeen owned by the firm; the remainder being used for coal and ore banks, pig-iron, etc. The rolling mill is a fine frame building, replete with the most modern appliances for preparing the iron for the nail mills. It contains fourteen puddling furnaces, three heating furnaces, a squeezer, one train of rolls, and shears for cutting nail-plate. All the iron is boiled. In the nail mill there are sixty-six machines, solely for nails. Their specialty is cut nails, from a 2 D fine to an 8-inch spike. These machines, for compactness and the amount of work they perform, are not probably excelled by any

others in the United States. Indeed, the machinery throughout the entire establishment is of the latest and most approved character, and by its superior effectiveness affords one of the best possible examples of the advantage of applying scientific knowledge to industrial processes. The product of the works is from 150,000 to 160,000 kegs of nails per annum, which, at present prices (1874), is equal to $750,000—all of which finds a ready market in New York, Philadelphia, Baltimore, and in the Southern and Western States. All the kegs used in packing the nails are made on the premises. About 175 hands are constantly employed, and the pay-roll amounts to some $16,000 monthly. The success which has attended this firm is a proof of their business capacity and their talent for industrial organization, the entire establishment being a model of neatness and energy; while the affectionate regard in which they are held by their employés, and the confidence and respect they have acquired in the community, are evidences of their high character.

GEORGE BAILEY, M. D., was born, 1827, in Chester county, Pennsylvania, and is a son of Joseph Bailey, then engaged in agricultural pursuits. In 1838, the latter removed to Coatesville, where he became interested in the manufacture of boiler iron at the old Lukens Mill, where that class of iron was first made to any extent in this country. In 1844, he removed to Berks county, Pennsylvania, near Pottstown, where he erected iron works, and is still engaged in iron manufacture. Meanwhile, his son, George, was educated at an academy under the care of Orthodox Friends, and subsequently taught the Latin and Greek languages in the same institution for two years. He began the study of medicine in 1848, at the University of Pennsylvania, graduating therefrom in 1851 with the degree of Doctor of Medicine, but never practised his profession to any extent. It was at his father's works, in Berks county, that he obtained his first insight into the manufacture of iron; and, his preferences lying in that direction, he abandoned medicine, and with his brother, Charles L., embarked in the enterprise of erecting the Central Iron Works, at Harrisburg. From the date of the founding of these works (1852) he resided in that city; but in 1866 he removed to Philadelphia, where his family have since dwelt, although he passes two-thirds of his time in Harrisburg, where his interests are located. He has ever taken a deep interest in the prosperity of that city, which he believes is destined to become a great manufacturing centre. In this connection it may be remarked that both himself and brother, in inaugurating the Central Iron Works, in 1852, gave the first impetus towards the establishment of industrial establishments in that city, and have probably done more than any others to advance its manufacturing interests, as both of them recognized at an early day its advantages for the distribution of goods. During and since Dr. Bailey's residence in Harrisburg, he has been a trustee of several charitable institutions, and has served as a member of the City Councils.

FRANKLIN IRON WORKS, Colonel William W. Jennings, Proprietor, Harrisburg, consist of a machine works and foundry. They were founded in July, 1859, with a capital of $10,000, obtained upon credit, by the present proprietor, then just twenty-one years of age. In two buildings, one 30 by 40 feet, which was used as a foundry, and a finishing shop, 20 by 30 feet, the young mechanic entered into the struggle for wealth and reputation. At first employing from eight to ten hands and turning out work to the amount of $10,000 per year, the skilful management of his affairs, together with the excellent articles which the practical and scientific knowledge of the proprietor enabled him to produce, quickly caused the trade of the establishment to exhibit a marked advancement. The increase in business steadily continued, and the permanent prosperity of the business was more than assured when the outbreak of the civil war called the proprietor from his private enterprise to public position in defence of the nation. Occupied as a military and civil officer for several years, Colonel Jennings was unable to devote the necessary time and attention to the works which he had founded, and the business consequently decreased. Retiring from public life at the conclusion of the war, and associating in partnership with J. M. Stover, a young man of rare business ability, he applied himself assiduously to the rebuilding of his business. Notwithstanding a serious check in the burning of the machine shop, on the night of May 2d, 1868, causing a loss of over $12,000, the young firm have, by industry, skill and indomitable perseverance, fully recovered from their losses and gained for their establishment a flourishing trade and an enviable position amongst the local features of industry and skill in the city of Harrisburg. At present the works, which are situated at the corner of South and Sport streets, furnish employment to about seventy hands, demand an investment of $50,000 and produce goods to the amount of over

Geo Bailey

$70,000 annually. The excellence of the productions of the Franklin Iron Works, the result of the practical knowledge and educated intelligence of the proprietor, is universally acknowledged and is continually extending the business connection of the establishment. The architectural department is especially under the control of Colonel Jennings, and the work of this branch of the trade is calculated to excite the greatest admiration at the standard of perfection reached. The premises now cover a space of 210 by 150 feet, and the ever-increasing demand for the goods manufactured at these works plainly foreshadows their speedy extension in producing facilities.

WILLIAM W. JENNINGS was born in Harrisburg, Pennsylvania, July 26th, 1838, and received a thorough English education in the public schools of his native city. Upon arriving at a suitable age, he was received, at his own request, into the foundry of his father. Here he fully mastered all the details, practical and scientific, of the trades of founder and machinist. At the age of twenty-one, with a capital of $10,000, he started business for himself. His patriotic impulses, at the breaking out of the civil war, caused him to forget self and business and at once enlist in the service of his country. Entering the army as a private, a very considerable military experience, gained prior to the war, added to decided martial tastes, caused his rapid promotion. He was elected to the first lieutenancy of his company, and served with it in the field during its three months term. Appointed by the Governor, Post-Adjutant and Drill-Master at Camp Curtin, he soon tired of the life of a home soldier, and sought active employment. He raised the 127th Regiment Pennsylvania Volunteers, and commanded it with honor to himself and country in many well-fought and bloody battles, until May 29th, 1863, when it was mustered out. He subsequently commanded the 26th "Emergency" Regiment, during Lee's invasion. His faithful and meritorious services were acknowledged by his fellow-citizens. In the fall of 1863, he was elected, by a large majority, Sheriff of Dauphin county. His record as a civil officer was as honorable as that of his military career. After leaving public station he devoted his attention to his personal business, and associated in partnership with J. M. Stoever. He was married, in 1861, to Emma J. Van Horne. In 1870, he again engaged in a political contest, as the Republican nominee for Mayor of Harrisburg, but, the city being Democratic, he was defeated. In 1874, he was a member of the Republican State Convention, the first that nominated a Lieutenant-Governor. His influence and reputation, gained by energy, ability and fearless honesty, is steadily increasing the great estimation in which he is already held.

CARBON IRON COMPANY, Dennis Bowman, President. The first furnace of the present company was erected in 1855, by Bowman, Brothers & Co., at Parryville, Carbon county, Pennsylvania. There are now three furnaces belonging to the company; the height of the stacks is 52 and 55 feet, and the diameters of the boshes are 12, 16 and 18 feet. The ores used are the hematite and magnetic, and the average annual product is stated at 30,000 tons of pig metal.

SCHOFIELD, MASON & CO., Manufacturers of Worsteds and Woollen Yarns, Philadelphia. This establishment was founded by Benjamin Schofield (father of the present head of the firm), in 1847. He commenced by renting the second story of a mill at Twenty-first and Hamilton streets, where he employed twelve hands; and during the first year turned out about 100,000 pounds of yarns. Here he continued three years, and in 1850 bought and removed to a factory at West Manayunk, formerly occupied by J. & R. Wetherill. This was a four story building, measuring 33 feet by 50 feet. The machinery was driven by water; twenty hands were employed, and the produce the first year was about 180,000 pounds of yarn. Soon after the year 1850, the building was enlarged to 90 feet by 33 feet; a steam engine of twenty horse power was erected, and the average yearly produce became 250,000 pounds of yarn. The sons of Benjamin Schofield—Benjamin Schofield, Jr., and John Schofield—were admitted to partnership, and the business, under the firm-name of B. Schofield & Sons, progressed without event of note till 1857, when B. Schofield, Sr., retired from the business, and the name of the firm became B. Schofield, Jr., & Brother. The business continued steadily to increase, and in 1872 a new mill was built close to the old one. This new mill, which is devoted solely to the manufacture of carpet yarns, is a four story building, with an area of 55 feet by 75 feet; and the machinery is driven by a steam engine of 100 horse power. The two mills now employ about fifty hands, and manufacture 350,000 pounds of

woollen yarns and 130,000 pounds of worsted yarns per annum. In January, 1874, Edward F. Mason was received into partnership, and the firm has since been known as Schofield, Mason & Co. The satisfactory progress and condition of this business is attributed to the substantial basis on which it was founded, and to the firm being distinguished rather for prudence and economy than for speculation.

BENJAMIN SCHOFIELD was born, November 20th, 1825, at Huddersfield, England. At the age of eighteen he accompanied his family to this country, and was employed in wool sorting, for Bethel Moore, at Gulf Creek, Montgomery county. Here he remained two years, and soon after leaving joined his father in the manufacture of yarns. In 1871, he became a school director of the Twenty-first Ward. He is also well known as a local preacher; and, besides being connected with many benevolent societies, is President of the Historical Society of the Philadelphia Methodist Conference.

S. B. & M. FLEISHER, Manufacturers of "Star" Braid, Philadelphia. This firm commenced business in 1864, at Twenty-second and Wood streets. Fifty hands were employed, and during the first year the daily produce averaged 500 dozen of skirt braids and fifty gross of high number braids. The business steadily growing, in 1871 the firm built and removed to a factory on Hamilton street, below Twenty-fourth. This factory is a three story brick building, having a frontage of 90 and a depth of 140 feet. Close by is the dyeing and finishing house, of the same height and material, measuring 50 feet by 80 feet. The business continued to increase, and now 300 hands are employed, viz.: 150 in the factory proper, ten in the dyeing and finishing house and 140 in the yarn factory. The branch of manufacture carried on in the last named building has been organized but quite recently, the firm having been in the habit of buying the worsted yarn from which they manufacture braid. But, in 1874, a site was chosen at Twenty-third and Race streets, and a factory built, a three story brick structure, measuring, with out-buildings, 50 feet by 140 feet. Here 650 pounds of yarn are daily produced for the use of the braid factory, which turns out every day 1600 dozen skirt braids and 200 gross of high number braids. At starting, the firm determined not to allow competition to drive them to the production of any but a high class article; and to this policy is mainly owing the celebrity of the "Star" braid and the success of the establishment. S. B. & M. Fleisher may be deemed the pioneers in this branch of manufacture, and their business is already the largest in the country among those devoted exclusively to the making of braids. To meet the demands of the still increasing trade, extensive premises at Twenty-fifth and Biddle streets have been bought, and to these the firm will remove when such alterations and additions shall have been made as will enable them to gather all the now scattered departments under one roof.

SIMON B. FLEISHER, who has charge of the mercantile department of this establishment, is of German parentage, and was born in Philadelphia, September 14th, 1840. After receiving his education in that city and in New York, he, at the age of sixteen, went into Crawford county, Pennsylvania, and there engaged in wool dealing for about six years. He then followed the same occupation in New York, till 1864, when he returned to Philadelphia and commenced the manufacture of the "Star" braid.

MOYER FLEISHER, brother to Simon B. Fleisher, was born at Meadville, Crawford county, Pennsylvania, February 19th, 1842. After leaving school he commenced to work as a machinist, and continued to do so till he embarked with his brother in their present enterprise.

WILLIAM HALL & CO., Manufacturers of Shoddy, Pattonville, Delaware county.—This business was originated by William Hall and George W. Patton, who, in 1867, started a manufactory at Darby, Delaware county. It was a two story stone building, with an area of 25 feet by 40 feet. The machinery was driven by water; six hands were employed, and the average amount of shoddy produced was 10,000 pounds weekly. In 1870, the firm removed to Pattonville, where they had purchased, some time before, a building which had been previously used as a warehouse. This they converted into a shoddy manufactory. It is of brick, is two stories in height, and measures 50 feet by 75 feet; and adjoining is a house for boilers, measuring 20 feet by 25 feet. Close by are eight dwelling houses, occupied by the hands, of which there are now ten. The machinery consists of two boilers, each of seventy horse power; one engine of fifty horse

power; three rag-pickers; one duster; one willow (for cleaning waste); one lumper and one burring machine. Besides manufacturing, the firm do a large wholesale trade in rags and wool waste; and to provide for this have a warehouse on Water street, Philadelphia, where fifty-five women are employed preparing woollen rags for the mill and market. The prejudice against cloth made of shoddy is rapidly dying out; and it is to this and to the rise in the price of wool and cotton, added to the enterprise of the firm, that the success of this business may be attributed. It is already the largest of its class in the State. The machinery is being increased by the addition of four Garnett machines for opening hard waste, and soon, therefore, greater results may be expected.

WILLIAM HALL was born, January 17th, 1820, at Castletown, Derbyshire, England. After leaving school he served an apprenticeship to weaving, and came to Philadelphia in 1841. For five years he was employed at weaving, and then became manager of several mills, till 1854, in which year he started in the waste business, and in 1860 commenced the manufacture of woollen goods, in partnership with Joseph Garsed. This partnership was dissolved in 1863, when he again engaged in the waste business, and in 1867 embarked with George W. Patton in their present enterprise.

GEORGE W. PATTON is of American parentage, and was born in Philadelphia, February 22d, 1838. After receiving his education at the public schools, he was, at the age of sixteen, apprenticed for five years to the Pennsylvania Railroad Company, to learn car building, and at the expiration of this term he worked for two years in the Navy Yard. He then for six years engaged in the manufacture of mosquito netting, and in 1867 became associated with William Hall, and embarked in the present enterprise. George W. Patton married in 1861, and has three children.

WILLIAM MASSEY & CO.'S BREWERY, Philadelphia. This immense establishment, believed to be the largest in the United States, is located at the northwest corner of Tenth and Filbert streets. For over half a century this site, or at least a portion of it, has been devoted to the brewing of malt liquors. In 1822, a stock company was formed, consisting of farmers belonging to Chester and Delaware counties, to carry on a brewery, where they might dispose of their barley and at the same time secure a supply of cheap brewers' grains, wherewith to feed their cattle during the late autumn, winter and early spring months. But this project failed, and the property passed into the hands of the "Brewers' Association of Philadelphia," and these subsequently sold the establishment to Mordecai L. Dawson, a member of the association, and whose ancestors had been prominent brewers for a period of eighty years. The new proprietor operated the brewery very successfully for a number of years, and then, in 1849, disposed of it to the firm of Poultney, Collins & Massey, by whom it was greatly enlarged in 1855. In the course of a few years the firm's style was changed—by the withdrawal of Mr. Poultney and the admission of new members—to Massey, Collins & Co.; and subsequently the name was again changed to its present appellation, William Massey & Co., consisting of William Massey, John Gardiner, James M. Hall and William Massey Robinson. These gentlemen have very largely increased the extent and facilities of the old place, and at present possess the largest brewery and malt house in Pennsylvania, if not in the country, there having been brewed during the season of 1872–'73 113,000 barrels of ale and porter, each vessel having the capacity of thirty gallons. To produce this result, 250,000 bushels of barley and 125 tons of hops were used; and the establishment can produce 200,000 barrels, if demanded. The buildings are of considerable magnitude, measuring about 300 feet in front on Filbert street and 150 feet on Tenth street. The portion of the buildings enlarged in 1855 are six stories in height, while the new addition, erected recently, is of eight stories. It will be seen, therefore, that the floorage of this great brewery can be estimated by the acre. The cellars and vaults, used for the storage of the liquors when brewed, are also extensive; for a large portion of the ales are kept in stock for some time previous to being marketed—a proceeding which locks up in idleness a great deal of capital, but which, on the other hand, provides the public with a drink far more wholesome, and gains for the brewer a fame that, in the end, more than compensates for what seems a temporary pecuniary loss. There are seventy-four large wooden reservoirs ranged in rows in these spacious vaults, which extend far under Tenth street. When the ale is needed, it is raised from these vessels by means of a steam pump on the first floor. The barrel department occupies a large court yard, where there are tiers of casks ready to be filled. Hundreds more are being brought in by returning

wagons, and each and every one on its arrival is carefully examined; if perfect, it is thoroughly cleansed in a hot bath; if, however, there is a taint of acidity perceptible, it is subjected to thorough and complete purification. There are about 130 men employed by the firm, and the pay-roll amounts to $65,000 per annum. The value of the ale and porter produced averages $1,000,000 yearly.

WILLIAM MASSEY, the senior member of the firm, was born, November 16th, 1808, in Liverpool, England, and, while an infant, his father removed to Hawley Potteries, Staffordshire, where he received his education. He then entered his father's establishment, where he learned the art of brewing. In 1828, he emigrated to the United States, the voyage occupying five months, as the vessel, through stress of weather, was compelled to bear up for Fayal, in the Azore Islands, to repair and refit. On his arrival in Philadelphia, he found employment in Gray's brewery, where he remained two years, and then proceeded to New Orleans, becoming engaged in that city in the bottling business. He resided there for twenty-four years, and during the entire period never experienced any of the miasmatic diseases so common to that locality. He was always actively engaged in attending to the manifold details of his business, which prospered from year to year. In 1849, and five years previous to his leaving New Orleans, he became identified with the brewery which now bears his name, and finally, in 1854, bade farewell to New Orleans and returned North, where he has ever since resided. His reputation for liberality to charitable institutions and to the worthy poor is well known, and the daily record of current events bears witness to his efforts to advance the commercial and manufacturing interests of the city of his adoption. He was elected President of the Commercial Exchange for the year 1875. He is a member of the Albion and Hibernian Societies, was for a long period Vice-President and is now President of the Society of the Sons of St. George, for the relief of Englishmen in distress. Since the establishment of the Reform Club he has been elected one of its governors.

JOSEPH FORKER, whose name is prominently connected with many of the iron furnaces, coal mines and other enterprises of the Shenango Valley, was born, March 6th, 1829, in the borough of Mercer, Pennsylvania, and is a son of John Forker, also a Pennsylvanian by birth, who settled in that section in 1816. He received his education in his native town, and then learned his father's trade—that of a gunsmith—continuing in the same for a considerable period, when he changed his avocation and became a clerk for his brother, Henry, in the latter's drug store, remaining in that capacity until 1857, when he purchased the business and conducted it for seven years. He then disposed of the concern, and in 1865 engaged in the coal trade, becoming associated with Curtis, Henderson & Allen in opening the famous Black Diamond Mines, and succeeded in creating a large and prosperous trade, the yearly production of the same reaching 50,000 tons, and employing a force of 125 men. He is a director in the Sharon Banking Company, the Sharon Gas Company and in the Sharpsville & Oakland Railroad Company. He is an eminently successful business man, and enjoys in a high degree the confidence and respect of his fellow-citizens. He resides in Sharon.

SHENANGO PLANING MILLS AND CABINET FACTORY, Sharon, are owned by the firm of Wilson & Robinson Brothers, and were started in 1867. The grounds are about two acres in extent, and are located on the east side of Railroad street, in that borough. The building is 100 feet long and 80 feet wide—a portion of it being occupied by J. F. Weaver & Co.'s planing mill, door and sash factory. The machinery comprises a steam engine of forty-five horse power, which drives a "Boult's Carver and Moulder;" one of "Gear's Variety Moulder;" one "Surfacer and Matching Machine" of the Witherby, Rugg & Richardson pattern; one "Smith's Re-ripper;" together with all the new and labor-saving machinery adapted to an establishment of this character. From sixteen to eighteen hands are constantly employed, and a large amount of both plain and first-class furniture is manufactured yearly. The firm have a sales-room at No. 229 State street, Sharon; and also retail establishments in Moravia, Pennsylvania, and in Youngstown and Vienna, Ohio. The business is, considering the financial state of the country, in a fairly prosperous condition, although the sales have recently been lighter than usual. Since the works were first started they were entirely destroyed by fire, but were at once rebuilt and many improvements added.

J. M. WILSON, senior partner, was born, August 7th, 1820, in Brookfield, Trumbull county, Ohio, of American parentage, his father, James V.

William Massey

Wilson, a farmer, one of the first settlers in that locality, having removed thither from Washington county, Pennsylvania, where he was born and reared. He received his primary education at his birthplace, and afterwards attended an academy in Greene county, Ohio. On leaving school, he served an apprenticeship with an elder brother, learning the cabinet-maker's trade, and subsequently worked as a journeyman in Pittsburgh. He removed, in February, 1845, to Sharon, and in May of the same year entered into partnership with William Logan and Joseph Partridge, for the manufacture and sale of furniture. The latter withdrew from the firm in less than one year, and the former three years afterwards. He then conducted the business by himself, and subsequently with different partners, until 1867, when the Robinson Brothers (J. A. and W. H.) purchased a one-half interest in the stock and factory, which they still retain. J. M. Wilson is one of the pioneer business men of Sharon, there being scarcely another in that borough who has been in active commercial pursuits contemporaneously with him. He is an earnest member and an elder in the Presbyterian Church. He was married, in 1849, to Mary Quimby, of Sharon, and has a family of six children.

ETNA IRON COMPANY'S FURNACES, at New Castle, Lawrence county, were built in 1868, by A. L. Crawford and others, by whom they were operated about three years, when they were purchased by Samuel Kimberly, of Sharon, who has since managed them successfully. The premises consist of about eight acres of land, situated on the west side of the Shenango river, and near the depot of the Pittsburgh & Erie Railroad. There are two blast furnaces, each having a stack 57 feet high, and the boshes are 15 feet in diameter, in which are consumed 750 tons of ore, 500 tons of coal, 350 tons of coke and 450 tons of limestone weekly, turning out during that period about 450 tons of pig-metal. The buildings include a brick casting house, 75 feet by 150 feet; a frame stock house, 75 feet by 200 feet, and an engine house, containing two steam engines, one built by Mackintosh & Hemphill, the steam cylinder being 34 inches in diameter and the blast cylinder 84 inches in diameter, with a 4 feet stroke; the other was made by Robinson, Roy & Co., double blast, two cylinders, each 60 inches in diameter; a steam cylinder, 36 inches in diameter and 7 feet stroke. There is a force of fifty men employed; the works are constantly running and are in first rate order.

ROBERT MAIR & CO., Manufacturers of Cotton and Woollen Goods, Philadelphia. Robert Mair, the senior partner of this firm, is a native of Ayrshire, Scotland, and was born January 14th, 1829. He came to this country in 1844, and for some years was engaged in the manufacture of boots and shoes. He afterwards took to weaving; and in 1859, with his brother, James, commenced the manufacture of cotton goods in the Globe Mill, situated on Germantown avenue below Girard avenue. At starting, they possessed ten looms, employing about the same number of hands, and turning out an average of 2200 yards of cotton fabrics weekly. Under the careful and energetic management of the two brothers, the business steadily grew till the number of looms increased to seventy-two, employing over fifty hands and manufacturing about 16,000 yards per week. Then, in 1866, the firm, at that time known as J. & R. Mair, built and removed to the Kirkland Mill, at the corner of Adams and Amber streets, having a frontage of 60 feet on the former and of 150 feet on the latter. The mill is five stories in height, and contains 100 looms, driven by an engine of forty horse power. The number of hands employed varies, in the busiest times amounting to over 100; and the produce is in proportion. After the building of the Kirkland Mill, a new feature was introduced into the manufacture. Previously, only cotton goods were made; but now goods of mixed material, woollen and cotton, are also produced. In 1871, James Mair, the then head of this enterprising firm, retired from business; his son, James Mair, Jr., became a partner in his stead, and the firm-name has since been Robert Mair & Co.

SHARON FURNACE, Boyce, Rawle & Co., Proprietors. This furnace is located about midway between Sharpsville and Sharon, on the east side of the Shenango river, and on the line of the Pittsburgh & Erie Railroad. The premises consist of 160 acres of land. It was built in 1846, by the firm of Shoenberger, Agnew & Co., embracing Dr. Peter Shoenberger, David Agnew, George S. King and W. W. Bell, who operated it together for a time. Previous to 1852, the senior partner had purchased

the interests of King & Bell, and at the latter date that of the remaining partner, thus becoming sole proprietor. He continued the business for one year thereafter, and the furnace went out of blast and so remained for two years. After the death of Dr. Shoenberger, it came into the hands of the present proprietors, by whom the works were materially enlarged. As originally constructed, the furnace presented a stone stack, 40 feet high, with 10 feet diameter of bosh, in which native ores were smelted by coke and charcoal, producing about 1200 tons of pig-metal yearly and employing fifteen men. At present the yield is 10,000 tons of pig-iron per annum, requiring a force of twenty-five to thirty men. The furnace has recently gone out of blast, but is in good condition.

ALLAN FURNACE, Henderson, Allan & Co., Proprietors, Sharpsville. This furnace was built in 1868, by the present firm, composed of B. H. Henderson, Francis Allan and Joseph Foster. It is located in the borough of Sharpsville, on the line of the Pittsburgh & Erie and Sharpsville & Oakland Railroads, with both of which it is connected by rail and switches. The property includes twenty acres of land, on which is erected the furnace, with a stack 50 feet high and 12 feet diameter of bosh. Lake Superior ores are used exclusively, and the average annual product has been 10,000 tons of pig-metal. The furnace has been operated successfully from the very commencement, and is now in good condition. In connection with the furnace are the necessary buildings, including a casting house, 40 by 80 feet, and a frame stock house, 50 by 100 feet. The engine house contains a Mackintosh engine, with a steam cylinder 48 inches in diameter and a blast cylinder 72 inches in diameter. There are about twenty-five men constantly employed, for whose accommodation, with their families, there are fourteen frame tenement houses erected on the property. The pig-iron made at this furnace finds a ready market in Cleveland and Pittsburgh.

FRANCIS ALLAN, manager of the furnace, was born, March 17th, 1817, in Conyngham, Luzerne county, Pennsylvania, and is a son of Richard Allan, a native of Ireland, who removed, in 1827, to Waterford, Erie county, Pennsylvania, where Francis was educated. When he was nineteen years old he entered the store of B. B. Vincent, of Waterford, as a clerk, remaining there until 1839, when he engaged in business with C. C. Boyd—the firm being Boyd & Allan—and so continued for two years. He then removed to Erie, and was engaged as a clerk in the firm of Johnston, Himrod & Co., afterwards Vincent, Himrod & Co., where he remained until 1845; and next removed to Mercer county, as manager for the last-named firm, to superintend the erection of the Clay Furnace, which he operated until 1848, and then returned to Erie. In 1852, the furnace had become the property of the Sharon Iron Company, which engaged his services as manager, and he again removed to Mercer county and operated the furnace until 1861, when it was abandoned. He next became interested in the coal business, being associated therein with General Pierce and W. L. Scott, and prosecuted it successfully for six years, when he disposed of his interests in that direction, and in 1868 began the erection of the Allan Furnace, which he has since conducted. He is a resident of Sharpsville, where he commands the respect and esteem of his fellow-citizens as a gentleman of unblemished business reputation. He was married, in 1846, to Elizabeth, daughter of Henry W. Woodworth, of Conneaut, Ohio.

B. H. HENDERSON, senior member of the firm, was born, December 24th, 1823, in Norristown, Pennsylvania, and is a son of John H. Henderson, a native of the same place and engaged in the practice of law. He was educated at Allegheny College, Meadville. He early engaged in mercantile life in the borough of Mercer, and subsequently at New Castle, and was very successful. In 1868, he became interested in the Allan Furnace; and he is also connected with the works of J. J. Spearman & Co. He is a resident of Sharon, Pennsylvania; is a bachelor of scholarly attainments and highly cultivated literary tastes.

WILLIAM HILL, Manufacturer of Fancy Knit Goods and Spring and Fall Shawls, Philadelphia. This establishment was founded by William Hill, in 1868, on the premises he now occupies, at the corner of West York, Waterloo and Mascher streets. The factory is four stories in height, with a frontage of 32 and a depth of 110 feet. The machinery, comprising, among others, twenty-four weaving looms, which manufacture the shawls, and twelve power looms, for the knitted goods, is driven by an engine of forty horse power. This engine also supplies motive power to two adjacent establishments. At starting, forty hands were employed,

and during the first year $100,000 worth of goods was manufactured. This, in the hands of the proprietor, was followed by several years of steady and regular growth, till March, 1873, when George V. Neville and Allen C. Adamson were admitted as partners, the name of the firm becoming Neville, Hill & Co. Soon after this somewhat ill-starred change, in the fall of the same year, at the time of the bankruptcy of Jay Cooke & Co., the firm suspended. Their failure is attributed chiefly to injudicious management on the part of those employed to sell the produce on commission, the goods having been forced into the market at unseasonable times, and thus sacrificed. The liabilities amounted to $32,000; and a satisfactory settlement was made by William Hill on the understanding that he should become owner of all the assets, machinery, etc. This arrangement was carried out. William Hill again became sole proprietor, and has since conducted the business with great success. From eighty to one hundred hands are now constantly employed, and the value of the yearly produce has risen to $160,000. Nubias, men's and ladies' jackets, ladies' hoods and scarfs form the staple of the knitted woollen goods; while those woven consist of spring and fall shawls.

WILLIAM HILL is a native of Leicestershire, England, and was born May 1st, 1838. He came to this country in September, 1857; and, after spending eleven years in the employ of several Philadelphia firms, embarked in his present enterprise.

JOHN T. LEWIS & BROTHERS, Manufacturers of White and Red Lead, Linseed Oil, etc., Philadelphia. In 1813, Joseph Richardson established a white lead factory on a lot on Pine street, between Fifteenth and Sixteenth streets, and towards the close of 1819 disposed of the same to Mordecai and Samuel N. Lewis. The latter put the works in repair at once, and made during the first year 100 tons of white lead. The increase in the quantity produced was gradual, amounting in 1830 to 600 tons, and in 1840 to over 1000 tons. In 1827, they commenced the manufacture of Arctic acid, for their own use, in place of cider vinegar; and in 1830 that of linseed oil. In 1849, the firm purchased a lot in the district of Richmond, the present Nineteenth Ward of the consolidated city, having a front of 620 feet on Duke street and 360 feet on Huntingdon street, on which there was a white lead factory already in operation. The works were much enlarged, and, in addition to white lead, linseed oil and Arctic acid, they began the manufacture of red lead, litharge, orange mineral and acetate of lead, and at a later day other paints. In August, 1856, the firm of M. & S. N. Lewis, which had continued unchanged for fifty years, was succeeded by that of John T. Lewis & Brothers. The partners are John T., Saunders and George T. Lewis, brothers, with three nephews of the senior partner: Samuel U., John T., Jr., and William F. Lewis. Their present factory, on the lot above mentioned, is very extensive, and they have a capital invested of about $400,000, employing 140 hands, and produce annually, of white and red lead, litharge, etc., about 9,500,000 pounds; other paints, 1,200,000 pounds; linseed oil, about 95,000 gallons; and of vinegar, about 300,000 gallons. A high reputation was established by the old firm, in the purity and general excellence of their white lead, and this reputation has been fully maintained by their descendants and successors. As an evidence of this, it may be mentioned that the supply of nearly 10,000,000 pounds per annum is scarcely sufficient to meet the demand for the paints bearing their trade-mark. The counting-room of the house is at 231 South Front street, being the location in which the old firm commenced business in 1807. Thus for sixty-eight years the same premises have been uninterruptedly occupied by the original co-partnership and its successors, a circumstance worthy of note from its great rarity in this country. Some years ago the firm established private telegraphic communication between their office and manufactory, and it is now considered indispensable in their business, enabling them in a few minutes to inform a customer how soon his order will be shipped.

JOHN T. LEWIS was born in Philadelphia, December 12th, 1811, and is of Welsh descent. His father, Samuel N. Lewis, was a member of the well-known firm of M. & S. N. Lewis, ship-owners and shipping merchants. He was educated partly at the Friends' School, the Episcopal Academy and at the classical academy of Samuel Jones, besides taking private instruction in French and Spanish. After leaving school he entered his father's counting-house, and in course of time succeeded to the business. He is a director and manager of several institutions; prominent among these may be cited the Pennsylvania Hospital, of which he is the treasurer, having succeeded his father in that office, the latter having received the books from his brother: it may be mentioned that his grand-

father, Mordecai Lewis, was elected to the position in 1780, and thus this office has been held by a representative of the family for nearly a century. In fact, his ancestors on both sides have been actively interested in the institution since its foundation, in 1752. He was also a director and Secretary of the Academy of Fine Arts for a number of years.

CONESTOGA PRINT WORKS, James & John Hunter, Proprietors. These works were established in 1829, by the late Thomas Hunter, father of the present proprietors, at Hestonville, Philadelphia. The original building was a very old one, antedating the Revolutionary War, and during that memorable epoch was used as a foundry for casting cannon balls. It subsequently was converted into a button factory, then became a paper mill, and afterwards a dyeing and bleaching establishment. It was being used for this purpose when Thomas Hunter purchased the property and changed the same to suit the business in which he engaged. At the period when he commenced operations calico printing was done entirely by blocks, and water power was solely used. It was in 1832 that he began to employ machinery for this purpose, a copper cylinder, fabricated by John Agnew, of Philadelphia, who was so celebrated for many years as a builder of the most powerful hand engines in the United States for extinguishing fires; and the engraving of the rolls was the handiwork of the late Matthias W. Baldwin, afterwards the founder of the great locomotive works now bearing his name. At the period of introducing the cylinder for printing the cloth, the motive power was changed from water to steam, and it is believed that Thomas Hunter was the first person to use a steam engine in this connection. This change from block printing to the use of the cylinder effected a marked revolution in the character of the work done, as may be readily imagined. The proprietor continued the successful operation of these works until 1848, when he died, and was succeeded in business by two of his sons, the present proprietors, who had assisted their father for many years previously. By their vigorous management they have completely revolutionized the business, having from time to time adopted every known improvement, and to these added processes peculiarly their own, which have increased the value and popularity of the works. The establishment at the present day is very different from the one commenced nearly a half century ago. It is located on Paschal street, between Fifty-fifth and Fifty-sixth streets, occupying a very large area of surface. The works contain seven printing machines, two steam engines of 100 horse power each; twelve other steam engines, used for driving the machines, from ten to twelve horse power each; steam is furnished by twelve boilers of fifty horse power each, and by one Wiegand boiler of 140 horse power. The product of the works is about 12,000 pieces of standard Madder prints per week. The firm claim to have first introduced several new colors, which have proved most successful and popular. They also were the pioneers in the manufacture of "Alizirine," or extract of Madder, which has revolutionized the making of fast colors. It is also worthy of note that this house is the only one in the country which makes alizirine for sale. The products of these works are most favorably known in the markets of the principal cities of the country, and the success which has attended the proprietors from the very inception of the enterprise is the reward of their determination to excel in the production of their goods. The works themselves, in their location, possess great advantages over those in the Eastern States, in the ability to procure coal and fuel at a far cheaper rate.

THOMAS HUNTER was born in Belfast, Ireland, and there learned his trade of a calico printer. He came with his family to the United States about 1826 or 1827, and settled in Philadelphia, where he worked for a year or two in an establishment, so as to become better acquainted with the trade and with the people among whom his future lot was to be cast. He then purchased the Hestonville property, as before narrated, and conducted the works successfully until his death, in 1848, the result of injuries sustained in being thrown from his carriage.

JAMES HUNTER was born in Belfast, Ireland, May 6th, 1823. He was educated in Philadelphia, and at an early age went into his father's establishment, where he learned the business so thoroughly that he was enabled, at his father's death, to take hold and continue their management successfully.

JOHN HUNTER was also born in Belfast, in April, 1825, and was educated in Philadelphia. He also entered the works early in life and acquired the same thorough knowledge of the business as his brother.

STEWART IRON WORKS, Sharon, Mercer county, are owned by the Stewart Iron Company, of which David Stewart, of (119 Broadway) New York city, is President, and manufacture pig-iron, blooms and muck bar. This is a very extensive enterprise, including two large blast furnaces and equally large and well-appointed iron works. In 1870, the Otis Iron Company, of Cleveland, Ohio, erected what is now termed Furnace No. 1, which went into blast in April, 1871, and during the following summer this company added to the improvements already made by building twelve boiling furnaces, and commenced the manufacture of blooms; a Watt hammer, for forging car axles, etc., was also added. In 1872, this same company enlarged the works by the addition of four more boiling furnaces and one double train of muck rolls. In June of the same year, the Stewart Iron Company purchased the property and at once commenced the erection of a second furnace, now known as No. 2. The entire works are located on a tract of thirty acres of land, situated on the east side of the Shenango river, on the line of the Erie & Pittsburgh Railroad, and on the south of the borough of Sharon. The works at present consist of the two blast furnaces, No. 1 having a stack 51 feet high, and 12 feet 9 inches diameter of bosh; while No. 2 has a 55 feet stack, and the bosh is 14 feet in diameter. The former has been in operation about two and a-half years since it first went into blast, and the latter only about four months (November, 1874); No. 1 is being improved by the addition of a closed trap, No. 2 being open. The ores smelted in these furnaces are supplied from the Jackson Iron Company's mines, at Lake Superior, and the product averages 25,000 tons of pig-metal annually, which is used principally for conversion into steel, according to the Bessemer process. In connection with the furnaces are two casting houses, each 40 by 80 feet; a stock house, 250 feet long and 60 feet wide; a brick engine house, measuring 45 by 25 feet, which contains the engines for driving the blasts for the furnaces; one of these was built by Mackintosh & Hemphill, and the other was supplied by the Globe Iron Works, of Cleveland, Ohio. The rolling mill measures 275 feet in length and is 50 feet wide. When running on full time, it has a capacity of producing 7000 tons of blooms and muck bar annually; it has, since first commencing operations, been running about one year; but during the present winter (1874–'75) it is not in operation, although the works are in excellent condition. Since acquiring possession of this property, the Stewart Iron Company have constructed about one-third of a mile of railway track, connecting their works with the Pittsburgh & Erie Railroad, and also with the Mahoning branch of the Atlantic & Great Western Railway, thus enjoying first-class shipping facilities and also enabling them to receive their supplies of ore, etc., without breaking bulk. This private railway track also includes a railroad bridge over the Shenango river, which this company have erected. They are also the proprietors of a sixteen-ton locomotive engine, used for the express purpose of bringing supplies and moving their products. There are on the grounds eight double frame tenement houses, for the use of their employés. There are on hand (March, 1875) about 8000 tons of pig-iron and 5000 tons of ore. Thomas E. Blunt is the manager of the works, and Fayette Brown, of Cleveland, general agent.

JAMES SMITH & CO., Philadelphia, Manufacturers of Machine-card Clothing, Oak Leather Belting, Wool-card Stock Machinery, and of all necessary articles for the production of Cotton and Woollen fabrics; also dealers in Cotton and Woollen Machinery. In 1814, James Smith, the founder of this firm, commenced the manufacture of card clothing at Leicester, Massachusetts, and after continuing at that locality until 1830 removed to Philadelphia, where he engaged in the same enterprise. In 1847, Thomas Cunningham—the senior member of the present firm—became a co-partner. At different periods thereafter Lucien Brown, H. B. Lincoln, George Brown and F. P. Pendleton were admitted as members of the house, the founder meanwhile retiring from active mercantile pursuits, though his name is still retained for business purposes and out of respect to the pioneer of this branch of industry in this State and country outside of New England. The works are located at the corner of Marshall and Willow streets, occupying a three story brick building, measuring 30 by 60 feet, which contains over 100 machines for the manufacture of machine-card clothing, the greater portion of which are of their own construction. The original machine was patented in 1810, by Thomas Wittemore, though he was not the inventor. It was Elizur Smith, of Walpole, in the same State, who had conceived the idea and constructed the model. Instead of keeping his invention a secret and proceeding to secure a patent, he incautiously revealed the matter to his intimate friend Wittemore, who thereupon filed the necessary papers and procured

the patent. A number of improvements have been added from time to time, so that now the machine has reached such a degree of perfection, and its many successive movements such regularity and precision, that it verily seems to be endowed with human understanding—with a soul, and, like the brain, possessing so many organs, all of which act harmoniously together for the attainment of a certain end. To describe the *modus operandi* of these remarkable machines briefly, it is necessary to bear in mind that the entire system of cams, arms, springs, carriage, etc., are very complicated and at the same time compact, the whole machine being but 2 feet long and 3 feet in height and width. It is constructed of iron and steel throughout, and an inspection of its movements—at least twenty-five in number—is the best, if not the only means of comprehending the difficult but beautiful process of making, bending and inserting the teeth, and forming a comb which displays a workmanship that defies competition. The motive power is furnished by a ten horse engine, moving a cogged wheel, from which an axle extends about 18 inches in length, and thereupon ten cams are located at various distances from, and some touching, each other, and at different points on the surface of the axle, forming an irregular spiral. The first cam draws the wire from the coil into the machine a sufficient length to make one tooth; this is termed the "draw." The second cam raises another arm slightly, so as to fasten the wire and hold it in its position, while the first arm is withdrawn and placed in readiness to draw the wire for another tooth, when the depressed end of the second arm is raised by a spring, to permit the wire under it to be pushed forward. The third cam moves a third arm, which acts on the movable blade of a small shears, called the "cutter," and cuts the wire to the necessary length for the formation of the tooth. Thereupon, the fourth cam moves an arm which adjusts the "crowner," over which the crown or head of the tooth is properly formed. While this is being done, the fifth cam and the sixth act upon two small plates, which slide one upon the other, and by their sliding forward together—the former, however, a little before the latter—communicate a motion to what are termed the "fingers" and "doubler," and form a straight tooth, like a small staple, out of the piece of wire just cut; and as this tooth, thus formed, is being moved forward towards the leather (which is the basis of the machine card) by the sliding plates, the seventh cam moves an arm which raises the "doubler." The eighth cam now moves the "pricker" forward—an arm with two small thin sharp-pointed needles—which pricks two small holes in the leather, distant from each other equal to the width of the tooth, and as soon as these holes are punctured, the pricker is drawn back and the tooth pushed forward, its two points passing through the two holes just made to receive them, then over a small, flat, narrow, upright iron plate, with two little grooves or notches, and through two diminutive eyes at the end of two small bent upright arms. After the points of the tooth are thus held, and the tooth has been pushed forward, so that about one-eighth of an inch intervenes between its crown and the leather, the ninth cam moves an arm which acts upon the arms holding the points of the tooth, so that the ends of these arms with the eyes, holding the points of the tooth, are pressed downwards, thereby causing the knee in the tooth to be formed over the upright plate. This downward motion is sufficient to cause the points of the tooth to slip out and spring back just above the arms from which they have escaped. If, however, no points are pressed through the eyes at the required moment, by a peculiar and intricate movement the machine ceases its operation. But if the points appear regularly, the mechanism continues, and the next appearance of the pricker will push the tooth against the leather, its arm being wide enough on both sides of the needles to reach the tooth. Just before the pricker has performed its part, the tenth and last cam moves an arm which regulates the "stop-dog," a strong tooth which drops into the lower portion of the frame of the carriage, to hold it firmly, while the pricker pricks the holes in the leather. The carriage is a small upright frame, which works upon another fixed to the machine. It carries the leather, in making "fillet," from side to side, backward and forward, and after each successive movement draws it upward by rollers for another row of teeth. All the cams, after they have fulfilled their part, are drawn or pushed back into position by means of wire springs, and all in exact time. There is also a peculiar mechanism which imparts a certain motion to the carriage, so that the teeth are not set in a regular line, but vary with the arrangement and number of the teeth desired, and its rapidity in part depends upon the length of the teeth to be inserted. The number of teeth made and deposited by the machine is about 230 per minute, nearly four every second. The "fillet," in which the teeth are set, is a long narrow strip of leather, sometimes English composition cloth. It varies in width from 1 to 3 inches, and in length from 500 to 1000 feet, and is rolled in a coil and thus supplied to the machine. It is made by gluing together, by hand, short strips of leather,

properly shaved and trimmed to the required thickness and width, and is cut from sides of leather expressly tanned for the purpose; in fact, the best oak-tanned sides are purchased and re-tanned by the house, who invariably reject all chemically tanned leather. About 300 sides are cut up every week, making over 15,000 per annum. The wire used varies in thickness, from coarse, No. 18, to very fine, No. 40. The article mostly employed is No. 32. A portion of the wire is imported from England, and about fifty tons of it are cut into teeth yearly. There are about forty hands, including girls, employed in this branch of the business. More than 100,000 teeth are set in a day by each machine—the teeth being from half an inch to 2½ inches in length—averaging, therefore, about two and a-half miles of wire to each machine. The sheets and fillets, so manufactured, are disposed of to the cotton, woollen and hat factories in Pennsylvania, New Jersey, the Southern and Western States. This factory is the only one in the country outside of New England, has about one-tenth of all the machines in use and is the oldest establishment in the United States. The other department of the firm is termed the "Philadelphia Burring Machine Works," where is manufactured improved machinery for the preparation of stock for wool cards; also other machinery necessary for the production of cotton and woollen fabrics. There are about twenty hands constantly employed in this department. This house also manufacture leather belting from the best oak-tanned leather, which is first stretched by powerful machinery and put together in the best possible manner, so that it is uniform in thickness and will run in line, every lap being well made, thoroughly cemented and riveted. The warehouse, salesroom and offices of the firm are at No. 137 Market street, Philadelphia, where a full line of manufacturers' supplies is constantly kept on hand, in addition to the wares manufactured by them; and they are also large dealers in machinery for cotton and woollen manufacturers.

JAMES SMITH, the founder of the firm, was born in Rutland, Massachusetts, in 1788. He received his education in the public schools. On account of ill health he did not enter into business until at the age of nineteen he entered a store as clerk. He commenced the card manufacture in 1814, in Leicester, Massachusetts, at which time he married. In 1836, he left that place for Philadelphia. He retired from active business January 6th, 1869, and is now residing in Philadelphia. In politics he was originally a Federalist, then an old line Whig, and is now a Republican.

WHEELER IRON COMPANY is composed of E. A. Wheeler, Hiram Veech, W. W. Morrison, Elmer S. Reed, Alfred Strawbridge, T. Dwight Eels, Lloyd Reed, of Erie, and John M. Gliddon. The furnace was erected in 1872, and went into blast October 8th, 1873, since which date it has been constantly in operation. The premises consist of about eighteen acres of land, and are located on the east side of the Shenango river, in the borough of Middlesex, and on the line of the Pittsburgh & Erie Railroad. The stack is 51 feet high, open top, and the diameter of the bosh is 13 feet 6 inches. In this Lake Superior ores are smelted with block coal, the average annual capacity being 12,000 tons of pig-metal, requiring a force of thirty men. The engine was built by Mackintosh & Hemphill; the steam cylinder is 32 inches in diameter; the blowing cylinder, 72 inches in diameter, with a 4 feet stroke of piston. The furnace is in excellent running order.

E. A. WHEELER, senior partner and manager of the furnace, was born, September 28th, 1828, in Brookfield, Trumbull county, Ohio, of American parentage. He is a son of Alfred Wheeler, a native of Avon, Hartford county, Connecticut, who removed to Ohio in 1803, where he settled and followed the vocation of a farmer. He was educated in the district school of Brookfield, and when fifteen years old was apprenticed to learn the tin and copper-smith business in Warren, Ohio, in which he continued for three years, and subsequently as a journeyman until 1848, when he removed to Sharon, Pennsylvania, and commenced business in a small way on his own account, increasing it from time to time until 1861, when he disposed of the same. While engaged in the hardware business, he also carried on the manufacture of stoves, building a foundry for that purpose, which he operated very successfully. He now embarked in the coal business, in which he is still interested. In 1868, in connection with Boyce & Curtis, he opened the Butler Coal Mines, which have since been operated, yielding a largely remunerative product. In 1872, he erected the furnace which bears his name, and of which he retains the supervision. In 1871, he was elected a Representative in the lower branch of the Legislature, from the district composed of the counties of Mercer, Lawrence and Butler; and in 1873 was the candidate of the Temperance party for the office of Surveyor-General. He is prominently identified with the cause of temperance reform.

He is married and has one daughter, residing in Harrisburg; he himself resides in Sharon.

BASSETT & SONS, Paper Hangers, Varnishers and Manufacturers of Stucco Work, Pittsburgh. This firm is composed of George Bassett (father), Frederick Bassett and James Bassett (sons). They carry on business at No. 47 Seventh street. The senior of the firm began business in a small way, in 1835, and has followed it almost continuously up to the present time. After associating himself in several partnerships, he gave his son a share in the business, in 1855. This partnership was dissolved in 1862, or thereabouts, and in 1870 he admitted his two younger sons, named above. Of late years the business has been very prosperous, and from thirty to thirty-five hands are employed in the busy season. They claim great excellence in their line, especially in stucco work; and they do the largest paper hanging business in Pittsburgh The stucco work of St. Paul's Cathedral and the Custom House (Pittsburgh) are samples of their skill.

GEORGE BASSETT, the founder of the above business, was born in Bristol, England, in 1805, and is by trade a plasterer and worker in stucco. He came to this country in 1830, and worked in Philadelphia for two years. Coming to Pittsburgh in 1832, he engaged in various business ventures, and started the above establishment in 1835. Yielding to many temptations to speculate, he was at one time the owner and captain of a river steamer at New Orleans; at another the proprietor of a drug store, etc., always leaving his eldest son in charge of his regular business. Not meeting with success in any other business, he has of late years devoted his energies to building up a trade in that in which he first started. He is married, and is the father of eighteen children, fifteen of whom are living.

EXCELSIOR BRICK AND STONE COMPANY, Philadelphia: Edward J. Mathews, President; Walter D. Comegys, Treasurer. This company is the successor in business of the Excelsior Press Brick Manufacturing Company, and also of the Centennial Brick Company, the former of which was established in 1865, on a nominal capital of $400,000 and an actual cash capital of $160,000, and met with great success from the very commencement of the undertaking, manufacturing over 12,000,000 bricks yearly. Their machinery consisted of two of "Gregg's Improved Excelsior Brick Press Machines," the patents of which were purchased by the company. These machines are matchless, as regards their rapid execution and general efficiency, and are generally considered to be the best in existence. As a proof of this, it may be mentioned that the company employed the services of the distinguished patent-lawyer, Charles M. Keller, to thoroughly examine the various patents accorded different individuals for brick-manufacturing machines within the past decade, not only by the United States, but also by England, France and Belgium, when the verdict was pronounced in favor of the "Gregg Patent." This invention has received two prize medals, one for the machine, and one for the bricks made by it—the highest award in the class—at the Paris Exposition, 1867, in a contest largely represented by both Europe and America. The guiding principle of this invention seems to have been to obtain the greatest possible results from the machine with the smallest expenditure of money and labor. By carefully prepared statements, it has been ascertained that bricks of all grades can be made by this machine at a far less cost than those made by hand. The present company was chartered April 27th, 1874, with a capital stock of $500,000, divided into 5000 shares of $100 each. The principal works are located on the east side of York avenue, adjoining the Hunting Park, where the company own sixty-six acres of land, containing quarries of superior stone for foundation and superstructure building, and rubble pavements, besides clay of the best quality sufficient for a product of 250,000,000 bricks. Their branch works are at Twenty-ninth and Cumberland streets, about fifteen acres in extent, where they own the "clay leave" ample for the production of 200,000,000 bricks. They also own four of the Gregg machines, each capable of making 35,000 bricks in ten hours, beside other machinery and brick-work property. They are also using a "Blake Crusher," for the production of concrete and stone for turnpikes, walks, etc. The new works, adjoining the Hunting Park, now erecting, are expected to be in operation in April, 1875, which will enable the company to manufacture 150,000 bricks per day. All bricks made by this company are formed from well-tempered clay, subjected to a pressure of 100 tons in the machine, and dried by artificial heat, so that a day's product is dried and set in the kilns by the following morning, thus enabling the company to manufacture

every day throughout the year. The bricks so made are uniform in size, and are of superior beauty and strength, weighing from five to eight ounces more than hand-made bricks. The company are also manufacturing bricks of all colors and shades of colors, for ornamental and fancy inside and outside work. The process of applying the colors, which are fast, makes the bricks impenetrable by moisture. Hand-made, front and stretcher bricks of the finest quality are manufactured in large quantities by the company. Their stone quarries are being worked vigorously, and are producing stone which has already gained great favor in the Philadelphia market. The number of hands employed is about 200, and the bricks are shipped to all parts of the United States, there being of late years a large demand for fine front-bricks. They also have a large number of patrons at home, supplying bricks, among others, to the city of Philadelphia, for the new Public Buildings at Broad and Market streets; to the Centennial Buildings in Fairmount Park; to prominent culvert builders; to factories being constructed, and in large quantities to builders of private residences. The contract for the concrete stone for the foundation of the new Post Office, at Ninth and Chestnut streets, Philadelphia, was awarded to this company. This company own the patent-right for the Gregg machine for the five south-eastern counties of Pennsylvania; for ten of the middle and southern counties of New Jersey, and for the county of New Castle, Delaware. The company expect to make and sell 40,000,000 of bricks in 1875, and many thousand perches of stone. Contracts already closed warrant this expectation. The company's office is at No. 309 Walnut street, Philadelphia.

THOMAS BOOTH TAYLOR, Contractor and Builder, Frankford, Philadelphia, was born in the borough of Germantown, Pennsylvania, in 1828. His parents were of English birth, and emigrated to the United States a short time previous to the latter date; his father's occupation being that of a dyer. He attended the common school at Frankford, and when but ten years old commenced to work in a weaving mill on Adam street, in that borough, but only continued there a month, when the establishment was destroyed by fire. He then returned to school, and subsequently proceeded to Cedar Grove, where he found employment in a cotton mill, and remained there for a year. Returning to Frankford, he obtained a situation, and labored on until he was sixteen years of age, when he once more became a scholar. At the expiration of a year, he was indentured as an apprentice to William A. Warner, to learn the carpenter's trade. He left this business after twelve months' service, and for the next five years was with Jacob Lesher, in the carpentering business. His next move was to form a co-partnership with Thomas S. Foulkrod, to carry on the occupation of carpenters and builders, which firm existed for fourteen years, when it was dissolved, and he continued in the same line on his own account, and has so remained ever since. He has contracted for and erected a large number of buildings, prominent among which may be named the Odd Fellows' Hall, of Frankford; a church at Bridesburg, the contract price being $33,500; a German church for $12,000; the United Presbyterian Church, on Orthodox street, Frankford, the contract for the carpenter work being $7000. He attributes his success to the fact that his estimates are entirely correct, and to his being thoroughly conversant with all the numerous and varied requirements necessary to erect a building in its entirety. During the War of the Rebellion, he was in the military service, and was elected Second Lieutenant of Company B, 9th Regiment Pennsylvania Volunteers, and after doing duty at Chambersburg was honorably discharged. He is a prominent member of the Masonic order.

GREAT WESTERN GUN WORKS, Pittsburgh. This important industry of western Pennsylvania was founded by James H. Johnston, in 1866, in a small building at the corner of Penn and Wayne streets, Pittsburgh. The founder being a practical gun-maker and possessing natural business qualifications, his venture proved a success from the start. Two years later, in 1868, his little establishment was destroyed by fire, and the proprietor lost almost everything, having little or no insurance. However, with that energy born of a determination to make his way in the world, he recommenced operations at 179 Smithfield street, and soon recovered from the shock. Here business so prospered with him that he was compelled to seek more commodious quarters, and he moved his manufactory to the four story building at 285 Liberty street, in 1874. To give an idea of the rapid growth of the Great Western Gun Works, it

may be stated that the first year's business, in 1866, amounted to only $2500 in value; in 1874, it reached over $150,000. The proprietor finds his chief difficulty in obtaining skilled labor, and for this reason is compelled to have some of his finer stock manufactured in Europe. He employs on an average twenty-five men, all skilled workmen, and obtained after careful selection. He attributes his success to his practical knowledge of gun-making and strict attention to the wants of the trade, especially in sporting fire-arms, for which class of goods he has a constant demand in every State and Territory of the Union. The establishment is devoted exclusively to the manufacture and sale of fire-arms, and the proprietor gives his undivided attention to the business. He is the largest manufacturer and dealer in his line in the State west of the Alleghenies.

JAMES HAMPTON JOHNSTON, founder and sole proprietor, was born in the town of Waynesboro', Franklin county, Pennsylvania, December 16th, 1836. He grew to manhood in his native place, and there learned the trade of gun-maker. Just previous to the beginning of the late war, in 1860, he moved to Pittsburgh, and was appointed Master Armorer at the Arsenal there. In this position he served with credit until the close of the war, a period of five years. In the following year, with a small capital, he established the Great Western Gun Works, one of the most rapid and surprising business successes in the great manufacturing city of Pittsburgh. From a business of $2500, in 1866, in 1874 it had grown to the proportions of $150,000 annually, and is still increasing. Nor is this success the result of mere chance and a few speculative ventures; it has been the fruit of methodical business habits and that reliance which, with strict integrity and honesty of purpose, distinguishes the character of all self-made men.

GOODELL, BRAUN & WATERS, Manufacturers of Wood-working Machinery, Philadelphia. This business was originated by Austin W. Goodell and M. Felton, who, in 1860, leased a building which had been used as a lamp-black manufactory, and converted it into a foundry. This foundry is of stone, and, with out-buildings, is 80 feet square. Eight hands were employed at starting, and during the first year 250 tons of castings were made. Contiguous to the foundry was built the pattern shop, a two story brick building measuring 22 by 83 feet. The business steadily grew, and, in 1866, became connected with that of J. Braun & Co. (composed of John and Matthew Braun and Ernest Kock), who were carrying on a machine shop. Matthew Braun and Ernest Kock were bought out; D. A. Waters came in; and this department, under the name of Goodell, Braun & Co., was worked in connection with the foundry, whose firm-name continued to be, as before, M. Felton & Co. The machine shop, situated on Pennsylvania avenue close to the other premises, is an L shaped three story brick building. It has a frontage of 60 feet; the greatest depth is 98 and the least 40 feet. In 1866, some eight or nine hands did the work, and the yearly produce was valued at $20,000. Rapid growth continued to characterize the two establishments. Over 100 hands are now employed, and the estimated annual produce is 800 tons of castings from the foundry, and $100,000 worth of machinery from the machine shop. The staple article manufactured is wood-working machinery, consisting of planing and matching machines, which are sent into nearly every State in the Union. About 7000 lawn mowers are annually made; and these, in addition to a home trade, are exported largely to Germany, and in a smaller degree to England, France, Canada, South America, and South Africa. In 1869, Mr. Felton retired from business, his interest being purchased by Samuel A. Waters, and since that time Goodell, Braun & Waters has been the name of the machine shop, Goodell & Waters that of the foundry.

AUSTIN W. GOODELL is of English descent, his ancestors having crossed and settled at Salem, Massachusetts, in 1632. He himself was born, October 6th, 1832, in Worcester county, Massachusetts, where he was educated. At the age of nineteen he left school, and in April, 1854, became connected with the iron foundry of M. Felton & Co., at Millbury, Massachusetts. In the following October he received an interest in the business. The foundry at Millbury was sold in 1860, and he, with his father-in-law, removed to Philadelphia, and commenced the business sketched above.

JOHN BRAUN was born, December 6th, 1825, in the Grand Duchy of Luxembourg. He, with his brother, came to this country in 1852, and worked at lock-making in New Britain, Connecticut, for two years. Then they went to Worcester, Massachusetts, and were engaged in machine work till 1858, when they removed to Philadelphia. After working for a short time in the establishment of Furbush & Gage, they started business in Hudson

street, with Ernest Kock, their brother-in-law, and shortly after removed to the building on Pennsylvania avenue.

SAMUEL W. Goodell, and was born, September 20th, at Millbury, Massachusetts. Here he lived the greater part of his life, being engaged at different periods in various manufactures till 1869, when he removed to Philadelphia, and entered the firm of Goodell, Braun & Waters.

D. A. WATERS, son of Samuel A. Waters, was born at Millbury, Massachusetts, April 9th, 1840. On leaving school, at the age of nineteen, he entered the hardware trade at Lowell, Massachusetts, and remained there till the breaking out of the rebellion, when he joined the Sixth Massachusetts Regiment; and, after serving in various positions for nearly five years, in 1866 went to Philadelphia, and became one of the firm of Goodell, Braun & Co

FINLEY & SCHLICHTER, Manufacturers of Jute Rope, Twines, and Yarns, Philadelphia. This business was established by John McIntyre and Isaac Schlichter, who, in 1857, bought the Franklin Mill, at Lambertville, New Jersey, from Sprott Bros., who were using it for the manufacture of rope. It was a three story stone building measuring 40 by 60 feet; the machinery being driven by water from the Delaware & Raritan Canal. Thirty hands were employed, and the weekly produce averaged 6000 pounds of rope and yarns. The establishment existed without change till 1862, in which year John McIntyre died, and his interest was bought by Thomas Finley, the new firm being styled Finley & Schlichter. Soon after this change extra machinery was put in, the number of hands increased to forty, and the weekly produce to 15,000 pounds. Nothing more worthy of record occurred till July, 1865, when the mill was partly destroyed by fire, and damage done to the amount of $15,000, in part covered by insurance. The mill was immediately rebuilt, and its size increased to 40 by 100 feet, and additional machinery was put in. Fifty hands were employed, and 25,000 pounds of rope and yarns were turned out weekly. It was, though, soon found that during the dry season the supply of water was not sufficient to drive the increased machinery; besides this, much inconvenience was sustained through the canal being at times emptied for repairs; and, accordingly, a steam engine of eighty horse power was erected for use when needed. During the following six years the business steadily grew; and in 1871, the firm resolved to further increase their mill property; and, with this aim, bought the chemical works of Moro Phillips at Aramingo. They almost entirely rebuilt the structure, which is now of stone, three stories high, covering an area of 55 by 165 feet. Adjoining is an engine house 28 by 80 feet, surmounted by a chimney 95 feet in height, and containing two boilers and an engine of 200 horse power. Machinery was set up in the mill, and the manufacture of jute rope and yarns commenced with fifty hands, making about 30,000 pounds of rope and yarns each week. For two years both mills continued in uninterrupted operation; but in November, 1873, the Lambertville mill was again partially destroyed by fire; the destruction of property amounting this time to $10,000, $7000 being covered by insurance. After this second calamity the firm decided to discontinue operations at Lambertville, and the Belvedere & Delaware Railroad Company offering a fair price, the structure and site was sold to them, the engine disposed of to another purchaser, and the remainder of the machinery removed to Aramingo, leaving at Lambertville only a rope walk employing seven hands. One hundred and thirty hands work at the Aramingo Mill, which produces each week 39,000 pounds of rope, twine and yarns. An increase on this quantity may be expected, the whole of the machinery not being yet in working order. Of the raw material some is of native growth and other is imported from Calcutta. Jute rope is the staple article manufactured by Finley & Schlichter. In addition, they make bed cord, Venetian filling, seaming cord, rein web cord, wool twine, cotton rope, cotton banding, and all descriptions of hemp and flax twine.

THOMAS FINLEY was born in the north of Ireland, August 9th, 1814. He came to Philadelphia in 1831, and was employed in weaving. In the spring of 1844, he occupied a dwelling on Charlotta street above Girard avenue, and, with one loom, commenced to make carpets, turning out about 100 yards weekly. Here he continued about eighteen months, and then removed to premises at Fitzwater and Broad streets, increasing the number of looms to twelve, worked by eighteen hands. After being there three years the business had so grown that more extensive premises were needed, and the manufacture was removed to Rose street below Broad, where the number of hands employed was thirty; and about this time a store in which to retail the carpet was opened at Juniper and South

streets. Rapid growth continuing to characterize the business, in 1851, the manufacture was removed to a factory on Fourth street below George, which Thomas Finley had bought, together with nine adjacent houses. This factory is four stories high, and has a frontage of 65 feet, with a depth of 28 feet; and adjoining was a warehouse measuring 20 by 60 feet. Eighty-three hands were here employed, and the quantity of carpet produced averaged 6000 yards weekly. The business then continued for nine years with but one interruption. In 1855, the proprietor was a victim in the great railroad accident at Burlington, New Jersey, at which twenty-five people were killed. He was so severely injured that it was many months before he was able to give his wonted attention to business, and this necessarily entailed much loss. In 1862, he went into the manufacture of jute with Isaac Schlichter, and since that time has allowed the manufacture of carpet to decline, the other enterprise receiving the greater share of his attention; and now there are only ten looms, worked by fourteen hands, producing 750 yards of carpet weekly. One other enterprise in which he was concerned did not turn out so profitably. In 1856, he was led, by fallacious representations, to take part in the establishment of a foundry. He was very much deceived, and the loss was considerable, and fell entirely upon himself. In the following year he sold out at an almost ruinous sacrifice, and has since devoted all his energies to his other enterprises, in which he has been eminently successful, never paying less than one hundred cents in the dollar during the more than thirty years that he has been a manufacturer. He married in 1844, and has six children.

BERLIN FOUNDRY, claimed to be the oldest in Pittsburgh, was founded in 1810, by William Price, a native of England, who had emigrated to this country some years previously. He also built the first glass manufactory in Pittsburgh. It afterwards fell into the hands of Edward Dithridge, well known in that city, and now deceased. The founder of the Berlin Foundry died in 1855, at the age of eighty-five, and his son, William G. Price, succeeded to the business. He died in 1859, at the age of forty-one, and the business was continued by the widow, in his name, until her death, in 1874, when her son, William G. Price, succeeded to the management in the interests of the estate. The works are located at the corner of Price and Caldwell streets, and the main building is 200 by 60 feet. About fifty hands are employed in the manufacture of light castings, and the annual productions are valued at about $125,000.

HINCKLEY KNITTING MILLS, Aaron Jones & Sons, Germantown, Philadelphia.—The father of Aaron Jones, Sr., came to the United States in 1830, and settled in Germantown. He brought with him some old fashioned knitting frames, and commenced, in a small way, the manufacture of shirts, drawers, and woollen hosiery. His son Aaron Jones, Sr. of th

ployment in seeking a market for his father's small

class of goods, were comparatively unknown. His

died before the arrangements were perfected. Upon his father's death, Aaron Jones, Sr., took

carried on

mantown woollen hosiery and

The mills occupy 180 feet on Wister street, with a depth of 400 feet to Jefferson street, where the

frontage is equal to that on the former thoroughfare. When running on full time, over two hundred hands are employed, and the value of goods manufactured is estimated at $300,000 per annum. In 1866, he admitted his three sons, Thomas, Aaron, Jr., and John E. Jones, into partnership with him; and has transferred the active detail of the business to them, although he still remains the senior partner.

AARON JONES, SR., was born in Peckleton, Leicestershire, England, in 1807, where also he was educated. At the age of twenty-five he came to the United States, and joined his father as a weaver.

MERION FURNACES, J. B. Moorhead & Co., Proprietors, Philadelphia. Office, 230 South Third street. These works comprise two furnaces, which are located in the borough of West Conshohocken, Montgomery county. One of these was erected by the late Stephen Colwell, who operated it until 1857, when he disposed of it to the senior partner of the firm now owning it. The stack is 40 feet high, and the bosh has a diameter of 13 feet. Another furnace was built in 1872. It is larger than the first, having a stack 55 feet in height and 15 feet diameter of bosh. The two have a capacity of making 350 tons of pig-metal per week. The ores used are the hematites.

JOEL BARLOW MOORHEAD was born, April 13th, 1813, in Dauphin county, Pennsylvania. His father was collector of taxes for the Eastern District of Pennsylvania after the war of 1812, and died in 1817, leaving a widow and a family of nine children. She had a hard struggle to rear her children, and four sons were started early in life to support themselves and aid the others, and they were all successful in their several occupations, and made those dependent upon them comfortable in their declining days. Joel was an attendant upon the common country school, and when only eighteen years of age commenced business on his own account as a contractor on the State canals of Pennsylvania. He went West in 1837, and built bridges, etc., in Kentucky and Indiana. He was subsequently engaged as a contractor on railroads, bridges, locks, dams, and other improvements until 1855. He was Superintendent of the State Railroad, uniting Philadelphia and Columbia, from March, 1842, until April, 1844. In 1843, he was interested in a contract for improving the navigation of the Monongahela river by a series of pools, dams, and locks, popularly known as the Slackwater Navigation. This was completed in 1844, and opened up a large extent of country to the advantages of steam navigation, the locks being of a capacity sufficient to pass large steamers. In 1850, he effected a contract with the Sunbury & Erie Railroad Company for the construction of their line from Sunbury to Williamsport, which was finished, under many difficulties, in 1855. He had removed to Philadelphia in 1850, and has continuously resided in that city ever since. In 1857, as above stated, he embarked in the iron business. In politics he was a consistent Democrat until 1861, when he gave in his adhesion to Republican principles, and warmly espoused the cause of the Union.

JAMES W. WOODWELL & SON, Cabinet Ware and Chair Manufacturers, Pittsburgh. This business was first established, in 1833, by the firm of J. & J. W. Woodwell, at the corner of Third avenue and Smithfield street, where twenty-five hands were employed, and the value of products during the first year amounted to about $20,000. During the year following the firm removed to the corner of Fourth avenue and Smithfield street, and, in 1838, to the present location, which now embraces Nos. 97, 99 and 101 Third avenue. In 1839, James W. Woodwell purchased the interest of J. Woodwell, and continued the business alone until 1845, when he associated his son with him, constituting the firm as at present. This firm had barely been established before the great fire in the April of that year occurred, and all that the senior member possessed was consumed—factory, warehouse, dwelling, furniture, down to the very smallest article of personal property—nothing was left but life and cinders. But being energetic amid all his adversity, he commenced anew and rebuilt his factory, in which he was quite prosperous during the very first year thereafter, and so continued. In 1847, he was enabled to rebuild his warehouse—a four-storied brick building—at the same location. Business continuing to increase as years rolled on, he, in 1855, removed his residence to Wilkinsburg, where he had purchased some forty acres of an improved property, formerly owned by James Gray, and where he still resides, enjoying the retirement of a commodious suburban residence, which, with the surroundings, is valued at $250,000. Since the date of the great fire the business has been exceedingly prosperous, and he attributes his success to his

energy, perseverance, and to the fact that he has always endeavored to excel in the production of the finest furniture. His annual products at present are about $100,000.

PITTSBURGH LOCOMOTIVE & CAR WORKS. D. A. Stewart, President; Wilson Miller, Secretary and Treasurer. This enterprise was organized in the year 1865, under the manufacturing laws of the Commonwealth of Pennsylvania, with a capital stock of $400,000, the greater amount of which was subscribed for by those citizens of Pittsburgh who were desirous of extending the manufacturing importance of the city, and believed that so prominent a railway centre should supply to roads commencing or terminating there, and those also to the West, a portion, at least, of their requirements. The stockholders were aware that at first the business would not be immediately remunerative, as much time would be necessarily consumed in providing the necessary buildings and machinery for so heavy an enterprise. The improvements were commenced in August, 1865, and it required a little over a year to complete the establishment, before the company were able to receive orders. The first engine built was delivered in April, 1867, and the capacity of the establishment was about fifty engines of the ordinary dimensions per annum. Owing, however, to the depression in railroad business, apart from the difficulty attending the introduction of a new make of engines, the production of locomotives during the first three years was much below the maximum capacity of the works; but by exercising a constant watchfulness as to the quality of the workmanship and material used, the character of the engines soon became known and appreciated, and with returning prosperity the capacity of the establishment was taxed to the utmost; insomuch that, in 1872, the works were extended to about double their original dimensions, and are now capable of producing 100 engines per annum. Up to the time of the financial panic of 1873, the orders were continually augmenting. The works are located in the Sixth Ward of the city of Allegheny, and cover about nine acres of ground, fronting on Beaver avenue, and extending to the Ohio river. The tracks of the Cleveland & Pittsburgh Railroad bisect it, and sidings from the main track of that road enable the company to ship on their own wheels nearly all the engines, and to receive their material by the car load, thus avoiding the trouble, expense and delay of hauling. The buildings alone—exclusive of the necessary yard room—cover an area of nearly three acres, and embrace an iron foundry, a brass foundry, forge and boiler shop. Nearly everything used in the construction of a locomotive engine is manufactured in the establishment from the crude material, thereby affording the very best opportunity of knowing what is being used in the course of the work. The success which has attended the establishment may be stated to be due to the fact, that the workmanship is of the highest character, the material used in the construction being of the first class and carefully selected; and furthermore, in its being alive to all the new and important improvements in locomotive machinery, and constantly aiming to keep pace with the times, and with the progress that is ever attending the successful builder of railway moving stock. Up to the period that this enterprise was inaugurated there were no locomotive works west of the Allegheny Mountains. Several, indeed, had been started, but had all gone out of the business. This company may therefore lay claim to being the pioneer in this respect; for notwithstanding the dulness of the times prior to 1872, it had succeeded in maintaining not only its existence, but doubling its capacity, although established only so short a time. The total number of engines built from the commencement to the close of the year 1873 was 326, and engines made at these works are now running on the Central Railroad of New Jersey, the Northern Central Railway, the Baltimore & Ohio Railroad, the Allegheny Valley Railroad, the Dunkirk & Warren Railroad, the Pittsburgh & Connellsville Railroad, the Pittsburgh & Castle Shannon Railroad, the Cleveland & Pittsburgh Railroad, the Pittsburgh, Cincinnati & St. Louis Railroad, the Pittsburgh, Fort Wayne & Chicago Railway, the Little Miami Railroad, the Toledo, Wabash & Western Railroad, and the Northern Pacific Railroad.

CONNELLY, NAYLOR & CO., Constructors of Gas Works. Office, 38 Wood street, Pittsburgh. This firm dates from April, 1872, and is composed of Dr. J. H. Connelly, M. Naylor, J. S. Connelly, and T. E. Connelly, who associated themselves together for the purpose of building and equipping gas works of any magnitude and of any particular description, as best adapted to the locality; their specialty being coal-gas works for small towns. Dr. J. H. Connelly, the senior member of the firm, entered the business in 1863, having invented and patented the Petrolio Calcium Process for the

manufacture of gas. A company was subsequently organized in Wheeling, Virginia, called the Petrolio Calcium Gas Company, for the purpose of constructing gas works on this process, of which Dr. J. H. Connelly, the patentee, was elected superintendent. This organization operated for a period of between five and six years, when it was dissolved, and the business thereafter was carried on by the firm of J. H. Connelly & Sons. In 1870, a patent was awarded to Dr. Connelly for utilizing the waste gases passing from coke ovens, and a company was formed in Pittsburgh to operate the invention, which was termed the Smoke Consuming, Heat and Gas Company. The right to use this process was obtained from the latter by the Consolidated Gas Company, of Pittsburgh—a new organization—and this corporation immediately commenced the construction of works on the patent, under the direction of P. W. Mackenzie, Gas Engineer, of New York. The concern has now been in successful operation for eighteen months, giving perfect satisfaction and furnishing to consumers the cheapest gas in the United States. The process is especially adapted for large cities, and where there is a demand for hard coke. In this connection it may be remarked, that the gas is being taken successfully from the coke ovens in the Twelfth Ward, Pittsburgh, and used by the Pennsylvania Railroad Company for the purpose of heating their locomotives, thus entirely dispensing with wood. The company heat on an average fully twenty-five locomotives per day in this manner, thus effecting a great saving from the use of the waste gases. The firm of Connelly, Naylor & Co. employ a force of 50 to 300 hands, according to the season, and do a business each year of $250,000 to $300,000. They have constructed works and lighted as many as seven towns in one season.

CHESTER EDGE TOOL WORKS, John C. Beatty, Proprietor. The proprietor of these works is the surviving partner of the firm of William Beatty & Son. The establishment was originally located near Waterville, Delaware county, Pennsylvania, and as far back as 1806 William Beatty, the founder of the business, first engaged in the manufacture of axes. There were but two fires, and four hands employed; these made about five axes per day, and this product was materially increased as time elapsed. In 1840, the founder of the concern admitted his son, John C. Beatty, into partnership with him, constituting the firm of William Beatty & Son; and that firm continued until it was terminated by the death of William Beatty, March 12th, 1843. After this John C. Beatty continued the business, without change of firm, until 1850, when he disposed of the property to William P. Beatty and Samuel Ogden, who operated it for some years. In 1860, John C. Beatty purchased the interest of Ogden, and, in connection with William P. Beatty, carried on the business until 1862, when John A. Caldwell was admitted to the firm of William Beatty & Son. In 1867, Caldwell retired, and was succeeded by Thomas W. Woodward, who was in turn replaced, January 1st, 1869, by William H. Beatty. In October, 1871, John C. Beatty removed from Springfield (where the manufactory had been located since 1829) to Chester, Pennsylvania, when the present works were established. The ground occupied is over two acres, and is about 88 feet front by 1000 feet deep. On this are erected various buildings, comprising a forge shop, 70 by 40 feet; a two story building, 130 by 22 feet, the first floor of which is used as a grinding and turning mill, the second story being devoted to the polishing, handling and finishing of the articles manufactured, and also for storerooms. In addition to these, there is an engine house, 18 feet by 30 feet, with a tank for warm water in the second story; also offices, stables, etc. The machinery includes thirteen fires, eight trip-hammers, punching machines, heavy shears, friction wheels and all the best appliances for the manufacture of the finest quality of edge tools. A Corliss steam engine of sixty horse furnishes the motive power, and the works give employment to forty hands, who manufacture every day thirty dozen hatchets, five dozen hand-axes, five dozen butchers' cleavers, two and a-half dozen adzes, three dozen axes, four dozen picks, besides quantities of sledge-hammers, drawing-knives, chisels, bill-hooks, tussock hoes, ship-scrapers, railroad spiling, etc., etc. Altogether, there are made at these works about sixty different varieties of tools, and the reputation these have attained in the market is that accorded to the very best quality of edged implements.

WILLIAM BEATTY was born, 1791, in Delaware county, Pennsylvania, and was the son of Thomas Beatty, a native of Ireland, and for many years a ruling elder in the Presbyterian Church. His mother's ancestors were among the earliest settlers of Delaware county. He was educated in the schools of that period, but he was chiefly indebted to his own studious habits for the varied knowledge he acquired. He labored on a farm for a period, and was then indentured to Andrew

Lindsay, in Haverford, to learn blacksmithing. At the expiration of his apprenticeship, he engaged in business on his own account, and was the first manufacturer of edge tools from cast steel in the United States, and worker of cast steel. He devoted himself assiduously to his calling, and rose step by step until he attained the reputation of the best manufacturer in the country. Indeed, many Boston mechanics were among his customers, particularly ship-carpenters; and these would, in those early times, travel the long distance, give their orders verbally, and await the completion of their implements. He was one of the soldiers during the War of 1812, and died, March 12th, 1843.

JOHN C. BEATTY was born, February 5th, 1817, in Delaware county, Pennsylvania; is a son of William and Anne Beatty, and was educated in the country schools of his neighborhood. His father had, besides his factory, a farm and a grist mill. In the latter the son was employed in his early youth, and when seventeen years old became an apprentice in his father's business. He studied mechanical drawing in Philadelphia, and in 1840 was admitted a partner with his father. He is a prominent and public-spirited citizen, and while devoted to his avocation, nevertheless takes a deep interest in the great questions of the day.

F. H. STEWART & CO., Brush Manufacturers and Importers, 359 and 361 Liberty street, Pittsburgh. This is the oldest manufactory of the kind in the State west of the Alleghenies. David Stewart, the founder, was born in Philadelphia, in 1821, where he learned the trade of brushmaker. He removed to Pittsburgh when a young man, and there worked as journeyman. His energy and saving qualities soon enabled him to engage in manufacturing for himself, and from 1851 up to the time of his death, in 1868, he was at the head of a prosperous and yearly increasing business. After this event, his eldest son, F. H. Stewart, took charge of the establishment, in which position he continued until his death, in 1872, when this duty devolved upon C. E. Stewart (another son) and J. E. Sellers, the former managing for the estate of his father and the latter being accorded an interest therein as a reward for his business qualifications. The firm moved into their present three story building in 1874, where they keep on hand a large stock of paint, varnish, whitewash, kalsomining and every variety of brushes. They also import goods to some extent, and are the sole manufacturers of the "Garman Convertible Kalsomining and Paste Brush." The business is in a flourishing condition, and has doubled since the death of the founder. They do an extensive trade in the West, and, by close attention to business and the manufacture of a good article, find their goods always in demand.

LOWRY, HASTINGS & CO., Planing Mill, Sash and Door Factory, Indiana. This business was originally established by the firm of Sutor, Lowry & Co., in 1866, and is located on Railroad avenue, in the borough of Indiana. During the first year five hands were employed, and but a limited amount of business was transacted, estimated at about $5000. It has steadily increased since its inception, and has been constantly remunerative to the proprietors. In 1869, the present senior member of the firm disposed of his interest in the concern to I. P. Leach & Co., who operated the mill for one year, when the firm, in 1870, became Sutor, Leech & Co.; and in 1872 the present firm purchased the interests of Sutor and Leech, and now command an excellent line of customers. The number of hands now employed vary from ten to fourteen, according to the season. The special line of business in which the firm excel is architectural work, scroll sawing, brackets, etc.; and they attribute their success to close attention to their avocation and a desire to excel in the special branches. I. P. Leach, who represents the "Co." in this firm, is at present engaged as a builder and contractor, and his business, which is distinct from that of the firm, is quite considerable in extent.

WEST PHILADELPHIA FLINT GLASS WORKS occupy a site west of Thirty-third street, with fronts of 175 feet each on Market and Ludlow streets, and a depth of 215 feet. They were established in 1865, at Sansom street wharf, on the Schuylkill, by Gustavus and Francis Storm, associated in partnership as Storm Brothers. Finding the original works too contracted, they removed to their present location, January 1st, 1866, where they have greatly increased their capacity. The buildings occupied by their operations are located

principally on Ludlow street, the real front of the establishment, where, in addition to the large factory building, 140 by 65, they erected, in 1873, a fine wareroom, 25 by 100, five stories in height; there are also other capacious structures extending through to Market street, occupied for offices, storerooms and various other purposes. They use two furnaces and a fifteen horse engine, which, while principally occupied in grinding glass, furnishes the motive power for sundry other operations. They employ about 230 hands, and manufacture exclusively flint glass bottles for perfumers' and druggists' use, of which they turn out about $180,000 worth per annum. Their goods are sold principally in the New York market. Since 1874, they have added the manufacture of lamps, and are now furnishing a full assortment of every variety in the market. They have built up this trade without any assistance, by their own practical knowledge and experience.

GUSTAVUS and FRANCIS STORM were born and educated in Prussia, and have carried with them through life the effects of early discipline. Previous to the founding of the present enterprise, they were both engaged in the manufacture of chemical glassware, Francis being located in New York and Gustavus at 633 Market street, Philadelphia. The goods produced by this enterprising firm are among the best the market affords, and their own energy and efficiency are sufficient to insure the realization of their brightest prospects.

PITTSBURGH GLASS MANUFACTURING COMPANY, Challinor, Hogan & Co. These works were established in 1864, by a joint stock company, which employed some forty hands and manufactured lamp-chimneys and table glassware; the business done was, however, but a small one, and at the same time unprofitable. The present proprietors purchased the works in 1870, and the co-partnership dates from January 26th of that year. The firm is composed of David Challinor, Edward Hogan (who are the principal owners), Lucas Minehart and David Taylor. In 1871, they erected on the same site a factory with double the capacity of the old one, to which they have since continually added an increased space, and likewise many improvements, until the production and reputation of the goods made by them have rendered the establishment equal, if not superior, to that of any similar enterprise in the country. The wares are known and appreciated in all parts of the Union and Dominion of Canada, and their shipments are made to every prominent point in North America. Their specialties are in lamp-chimneys, silvered glassware and candy-jars. They employ about 120 operatives. They attribute their success to their practical knowledge of the business, which they have attained step by step, both the principal partners having been since an early age identified or employed in the glass business.

DAVID CHALLINOR was born, 1831, in Warwickshire, England, and on his arrival in the United States obtained employment at Gillan's, in New York, where he remained about a year. He thence removed to Pittsburgh, and was engaged at the Mulvany Works for some years, and subsequently was with Bakewell, Pears & Co., with whom he remained until he became associated, in 1870, in his present enterprise.

EDWARD HOGAN was born, 1831, in Ireland, and was educated in a private school. He came to the United States in 1849, and settled in Pittsburgh, where he became an apprentice to learn the glass business at the Mulvany Works. He remained there fifteen years, during different proprietorships, and filled different positions at various times, including that of manager and clerk. For the latter he was eminently qualified, having a practical knowledge of all the details of book-keeping.

NESHANNOCK IRON COMPANY, of New Castle, composed of George L. Reis, President, William E. Reis, Manager, P. L. Kimberly and G. A. Kimberly, operates a blast furnace which, erected in 1872, went into blast in the month of November of that year, and has so continued without interruption except when compelled to stop for repairs. The furnace is situated between the New Castle & Franklin Railroad and the Neshannock creek, the tract of land belonging to the company being some twenty acres in extent. The stack is 60 feet high, and the bosh is 15 feet in diameter. The ores reduced are the Lake Superior and native ores, and about 20,000 tons are annually consumed, requiring 12,000 tons of limestone and 1,000,000 bushels of coke for the purpose. The average yield is about 1100 tons of pig-metal per month. The casting house measures 50 by 90 feet, is built of brick, and

has an iron roof; the stock house is of frame, 70 by 140 feet in dimensions; the engine house is 40 by 35 feet, brick, and covered with an iron roof; while the boiler house measures 30 by 66 feet, and is wholly constructed of iron. The steam engine was built at the Cuyahoga Works, Cleveland, Ohio, and has a steam cylinder 30 inches in diameter, a blast cylinder 72 inches in diameter, with a 48-inch stroke of piston. There are two Player hot blasts. The company employs twenty hands, and at present (March, 1875) the works are in first-rate condition.

MARVIN & CO.'S CRACKER BAKERY, Pittsburgh. This prosperous business was founded by J. Davis, in 1815. He conducted it successfully for many years, and was succeeded by his sons, Robert and John. They in turn sold it to S. S. Marvin, in 1866. The latter had already been in the business three years in the same city. Five years later, in 1871, he formed a co-partnership with Cornelius Rumsey, under the style of Marvin & Co. They employ about sixty hands, and use the most improved machinery known in their manufactures. The bakery occupies Nos. 91 and 93 Liberty street, and is a building 50 by 112 feet, and four stories high. The firm give their sole attention to their business, and have a thorough knowledge of it. They particularly excel in the manufacture of biscuit and small cakes, for transportation, and are acknowledged to be the leading house in this line of the many in Pittsburgh.

SYLVESTER S. MARVIN was born in Monroe county, New York, and received a business education. He became a clerk in a store, and at the outbreak of the war entered the volunteer service. Leaving the army at the end of two years, he came to Pittsburgh with the special purpose of engaging in the bakery business, in which he has been successfully engaged ever since.

SUTTON & McCARTNEY, Manufacturers of Straw Boards, West Indiana. In 1854, a stock company was formed to undertake the manufacture of straw boards in the town of West Indiana. Among those associated in the enterprise were Judge White, James Sutton, John Shryock and others. This company operated the works for a few years, but without making much progress; nor was it profitable to any very great extent, but, on the contrary, rather unsatisfactory to those composing the company; so much so, in fact, that the stockholders deemed it advisable to close out the concern. Judge White and James Sutton became the purchasers of the establishment, which they operated very successfully for a certain length of time, when the former disposed of his interest to Samuel Allison, while James Sutton sold his share to his son, Thomas Sutton. From the origin of the enterprise up to this time the works were of the description commonly known as an Air Drying Mill; but the new proprietors changed the same by means of certain new machinery to a Steam Drying Mill. This firm continued the business until June, 1869, when Samuel Allison disposed of his interest to S. McCartney. For upwards of three years these gentlemen operated the mill with unabated success, and finally, in October, 1872, Thomas Sutton sold his share of the establishment to John Sutton, the firm-name remaining as before; it still continues as when formed, in 1869. The mill and necessary outbuildings occupy about six acres of ground, and the services of about fifteen men are constantly demanded to run the establishment. The firm attribute their success to the fact that they use nothing but the very best quality of material in their manufactures, and consequently produce only a superior article of board.

FULTON FOUNDRY AND MACHINE SHOP: Totten & Co., Pittsburgh. In 1855, Joseph Pennock established a stove manufactory, which business he carried on very successfully; and, finding it capable of development, on January 1st, 1863, converted the works into a rolling mill foundry, under the superintendence of Robert C. Totten, formerly of the Fort Pitt Cannon Foundry. Under his skilful management the establishment has assumed the importance it now possesses. The premises are well and centrally located on Twenty-fourth and Railroad streets, Pittsburgh, occupying about two and a-half acres of ground. The main foundry building is 85 by 220 feet; and the main machine shop—a new and handsome structure—is 70 by 120 feet; when both are fully occupied, employment is given to 200 men. The specialty of the firm is the excellence of their rolling mill machinery, their chilled rolls being pronounced by those who have used them, after years of trial, as being superior in surface and strength to all others.

They were the first to make chill rolls 31 inches in diameter and 96 inches long. The product of the foundry has increased from 2000 net tons of finished castings, turned out in 1863, to 4400 net tons in 1870. The value of the products yearly ranges between $300,000 and $500,000. During the past eleven years this firm has erected thirty first-class new rolling mills, with an aggregate annual capacity of 400,000 tons; being four-tenths of the entire increase in the United States, including the Pacific coast. It is believed this is far in advance of the product of any similar foundry in the same length of time, and—unlike most establishments, which furnish rolling mill machinery, but which depend upon other firms to provide either the engines or chill rolls—the house of Totten & Co. is prepared to make both engines and chill rolls, thus fully equipping a mill in all its departments; and can also, if necessary, undertake to erect a mill.

WASHINGTON PRINT WORKS, William Simpson & Sons, Proprietors, are located at the Falls of Schuylkill, on the west bank of the river, upon ground now included within Fairmount Park. They occupy the site of an old glass works, and were being operated for the printing of cottons by blocks, as early as 1805, by John Thoburn, who carried on his business in a row of old houses near the railroad bridge, and dyed indigo blue in a building now occupied in the present works. Having operated for some years, he was succeeded by William Taylor and Samuel Winpenny, in 1811, and they, under the name of Taylor & Winpenny, introduced the weaving of cotton and woollen goods, and executed many contracts for the United States Government. This firm continued until 1815, after which various changes occurred, a portion of the works being at one time occupied by George W. Watson as a carriage factory. William Simpson having purchased of Hugh Scott, in 1834, the works were operated for the printing of silks. Having accepted a partner in 1842, calico printing was introduced; but the new firm failed to harmonize and became deeply involved. William Simpson assumed again the sole management in 1844, and under his efficient and energetic management its affairs assumed a new aspect. Step by step the works were enlarged until they reached their present proportions. Thomas and William Simpson, Jr., having been admitted to a co-partnership, January 1st, 1869, the firm assumed its existing style. The works now comprise some thirty distinct buildings, and occupy—with their three large reservoirs, fed by a stream of the purest water, and other necessary appurtenances—seventeen acres of ground. They have all the most approved machinery known to their business, which, since 1864, has been the printing of cotton cloths alone. The propelling force is derived from twenty-six steam engines, five to sixty horse power, driven by fifteen boilers, three being horizontal tubular boilers of 150 horse power each, four upright tubular boilers of 500 horse, and eight cylinder boilers of 300 horse power. This vast propelling force requires a consumption of 1000 tons of coal per month. They have their own machine and repair shops, with all necessary equipments, and manufacture a large quantity of the drugs consumed in their operations. This establishment has long been noted for the superiority of its mourning goods, upon which they have been principally engaged; but they also manufacture shirtings and fancy goods. The Philadelphia & Reading Railroad passing through the works, and their front on the canal of the Schuylkill Navigation Company being extended, they enjoy ample facilities for transportation. The property having been granted to Fairmount Park by an Act of the Legislature, a removal becomes a necessity, and they have accordingly secured an extensive property at Chester, Pennsylvania, upon which it is their purpose to erect one of the most complete printing establishments in the country. They employ about 425 hands, with an average monthly pay roll of $16,000. The prints were known as the Washington and Franklin Prints until 1857, when William Simpson changed his label to the Atlantic, and finally, in 1865, sold them under his own name. Under each name they have enjoyed an enviable reputation.

WYOMING MILLS, also owned and operated by the same firm, are located at Norristown. Bernard McCredy and Samuel R. Wood purchased the old grist and saw mill of Levi Rawling, May 2d, 1825, and July 5th following bought additional property of John Markley. The sole water-power of the Schuylkill river having been vested in them, they sold a portion to Matthias Holstein, December 30th, 1825. An amicable partition was had between McCredy & Wood, February 4th, 1826, and John Savage purchased the share of the latter, August 20th, 1829. McCredy sold a portion to John Savage, deceased, in November, 1834, and, November 30th, 1841, he purchased of the trustees of Savage's estate the property previously set off to Samuel R. Wood, and continued to hold it until his death, when by his will, admitted to probate

December 4th, 1854, the property descended to his son Thomas McCredy, who had been from 1846 associated with his father as B. McCredy & Son. A co-partnership was then formed between Thomas McCredy and John D. Ewing, under the style of Thomas McCredy & Co., which continued until the death of Thomas McCredy. The mills were then operated by Robert Ewing & Son for some three years, after which they were leased by Callaghan & Bro., who engaged in the production of yarn. They purchased of the executors of Thomas McCredy's estate, April 13th, 1863, and continued to operate until they passed into the hands of William Simpson, June 20th, 1865. The mill structures are large and commodious, and are filled with machinery of the most approved pattern. They, with over seventy comfortable tenement houses, occupy two complete squares of ground. The motive power is derived from the waters of the Schuylkill, which were dammed by the founder, Bernard McCredy. It is utilized by means of two large Leffel turbine wheels. They employ about 200 hands, and the only product is 64 by 64 sq., of which they produce about 54,000 yards per week. Since January 1st, 1869, the younger members of the firm have contributed in no small degree to the maintenance of their rank among the representative firms of the State.

WILLIAM SIMPSON was born in Manchester, England, in 1808. His parents removed to America in 1821, and settled in Philadelphia; but in 1824, his father, also named William Simpson, removed to New York to prosecute his trade of a silk printer, and William learned the trade of block cutting for printing silks, serving an apprenticeship of several years with a printer named Bryant. Having removed to Jefferson, Ohio, about twelve miles from Steubenville, in 1828, he remained until 1834, when he returned to Philadelphia and engaged in the silk printing at the Falls of Schuylkill, as above noted. Amid difficulties and discouragements that would have overwhelmed any ordinary man, he advanced step by step, but during a brief partnership became deeply involved. Ridding himself of his partner, he assumed all the liabilities of the firm, and by the force of his individual energy recovered his standing and paid every dollar of the obligations, with interest for the full time it was held. The progress of business recited above affords ample proof of the untiring industry and recuperative force of the proprietor. Although he has achieved such great and well-merited success, he is plain and unassuming, and shrinks from public observation or notoriety. Few men are more strict or conscientious in business, and few enjoy such unlimited confidence among their fellow-men. He is known to few, but is affable and courteous to all.

COLUMBIA OIL COMPANY OF PENNSYLVANIA was chartered May 1st, 1861, with a capital stock of $200,000. The property at the outset consisted of a farm containing 500 acres of land, situated on Oil creek, in Venango county. In 1862, the company commenced prospecting for oil, and met with the greatest success. In 1864, the capital stock was increased to $2,500,000, divided into 50,000 shares of $50 each. In 1871, seventy-six acres of land were purchased in the Butler County Oil District, from which they have received 35,000 barrels of oil; and, in 1873, another farm in the same district was also purchased, which has produced 23,000 barrels. The total number of barrels of oil produced since the organization of the company until the close of 1873, aggregates the enormous number of 1,253,619 from the Columbia Farm alone. The total amount of dividends paid to stockholders up to the same period was $3,517,600. The office of the company is at No. 10 Sixth street, Pittsburgh.

HOLLIDAYSBURG FOUNDRY AND MACHINE SHOP, John R. McFarlane & Co. The business was commenced, in 1833, at Duncansville, by the father of the present proprietors, with a small capital. In 1835, the establishment was removed to its present location at Hollidaysburg. During the first year there were about ten hands employed, and the value of products was about $5000. The business was carried on very successfully by the projector until his death, in 1852, when his two sons succeeded him, and have increased it greatly. The works are located at the corner of Penn and Juniata streets, with a frontage of 200 feet and a depth of 150 feet, and are devoted to general manufacturing purposes. There are an air and a cupola furnace, the former holding ten tons; also three forges. At the present time there are about thirty-five hands employed, and the value of products averages $60,000 per annum. Their specialty is the building of steam engines, in which they have been very successful. They also manufacture large castings of excellent quality, self-oiling car wheels, and superior rolls, chilled or soft.

JOHN R. McFARLANE was born, March 5th, 1829, in Philadelphia, and received a common school education.

THOMAS McFARLANE, who represents the "Co." in the firm, was born, June 26th, 1830, in Wilmington, Delaware, and was likewise the recipient of a common school education. They both worked in their father's establishment, and at his death succeeded to the business. During the War of the Rebellion they both volunteered in the Third Pennsylvania Regiment for the three months' service; one was captain and the other lieutenant in the same company. They were afterwards connected with the One Hundred and Thirty-seventh Regiment in the nine months' service.

BLACK DIAMOND STEEL WORKS, Park, Brother & Co., Pittsburgh. These works were founded, in 1861, by James Park, Jr., David E. Park, William Smith, Thomas S. Blair, and Edwin Miles. Operations were commenced May 1st, 1862, the first steel being melted at noon on that day. The original production of these works consisted mainly of that grade of metal known by the name of "Best Cast Steel," the daily product being five tons, and requiring fifty hands in its manufacture. The production of the celebrated and approved combination of iron and cast steel, and soft centre cast steel for plows and other agricultural implements, also for burglar-proof safes and vaults, was first commenced at these works in 1863 (afterwards secured by letters patent), and is now extensively carried on. The present co-partnership was formed June 3d, 1873, and consists of the following persons: James Park, Jr., Charles L. Caldwell, Richard C. Gray, Winfield S. Kennedy, D. C. Clapp, John M. Clapp, and William G. Park. Cast steel in all its varieties or qualities is manufactured at these works; also what is known as German Steel, so extensively used in agricultural implements. The well-known brand of "Black Diamond Homogeneous Cast-Steel Boiler and Fire-Box Plate," and the various grades of steel used by railroad companies, are considered principal specialties. The present capacity of the works is fully twenty-five tons per day, or 7500 tons per annum, the number of workmen employed being 400. The ground, consisting of an area of over five acres, is bounded by Thirtieth, Thirty-first, and Railroad streets, and the Allegheny river, in the Twelfth Ward of the city of Pittsburgh, and is closely covered with buildings and machinery. With the present line of appliances, and the addition of furnaces for melting fifteen tons per day, the capacity of these works would be forty tons daily, or 12,000 tons yearly. The steel industry is fast becoming of national importance. It was only a few years ago that consumers of this important article depended on England for most of their supplies. Now there is double the amount manufactured in the United States to that imported; the total imports for 1873 (except Bessemer steel) being 21,000 tons, while this country produced an aggregate, during the same period, of 44,106 tons, employing over 7009 workmen in its manufacture, and capital amounting to $13,000,000, and the value of this product being $12,000,000. There are thirty-four establishments, of which Pennsylvania, as usual, leads the van, possessing fourteen; New England seven; New York four; New Jersey five; Ohio two; and one each in Maryland and West Virginia. The quality of the American article is fully equal, and in some respects superior, to any from abroad; and the American irons used in its production is fully equal to the best foreign metal. The prejudice against American steel, and in favor of English make, is fast dying out. Edge tool manufacturers who use the American "Best Cast Steel" are gradually gaining an enviable reputation for their goods. The Black Diamond Steel Works Company have sent three shipments of their celebrated "Homogeneous Crucible Cast-Steel Boiler and Fire-Box Plates" across the Atlantic, and are now making some 2000 plates to be used in the construction of locomotives for service in Russia.

PITTSBURGH STEEL WORKS, Anderson & Woods. These works were founded, in 1845, by Isaac Jones, of Pittsburgh, for the purpose of manufacturing steel. He used one furnace and employed a few hands. Shortly after, the business was carried on by the firm of Jones, Boyd & Co., John L. Boyd having become a partner in connection with William McCullough. The business was a success and the products increased, the quality of the steel being excellent. In 1865, R. J. Anderson and —— Wood having purchased the interests of Jones, Boyd & Co., succeeded them in operating the establishment, which they extended on a large scale, enabling them to increase the yield of 1600 tons per annum to a product of 6000 tons. It is asserted that they were the first parties to successfully introduce the Siemen's furnace in the United States.

The premises occupy two blocks on Brackenridge, Ross, Second and Try streets. The works employ about 300 hands, with a business of $1,000,000 per annum.

WORKMAN & CO.'S CARRIAGE MANUFACTORY, Allegheny City. This extensive carriage manufactory, one of the largest in the State west of the Alleghenies, was established in 1860, by John Q. Workman. His capital was a thorough knowledge of the business and $125 in cash, and his location a small room in a building at 42 Arch street (then called Beaver), Allegheny City. For the first six months he worked unaided, when he began to gradually obtain help. Alexander Caskey became a partner in the business at this time, purchasing an interest for $50. He sold his interest for $1100 before a year had elapsed. The first year not more than half a dozen vehicles were manufactured, but they had built up quite a business in the repair line. William McCallum was then associated with the founder, but the latter bought him out for $4000 in less than two years' time, and sold the interest to A. Moore & Son. The firm now became known as Workman, Moore & Co., and so continued for four years, when the senior partner again bought out those associated with him, this time paying $9000 for the interest. It will be seen that, despite these frequent changes, the business was prospering. The building wherein the room was located in which the founder had first established himself had been purchased, and a vacant lot adjoining had been leased and a number of worksheds erected. Richard Davis now purchased an interest in the business, and the firm was known as Workman & Davis. This co-partnership established, in 1870, in Pittsburgh, a repository for the sale of carriages, which was discontinued the 1st of January, 1874. At this date Jacob Rook and A. R. Hardisty were admitted to partnership, and J. Q. Workman & Co. became the firm-name. All the partners are practical men, and work in the different departments of the business. The capital invested is about $50,000, real estate and stock. About thirty-five hands are employed in busy times, and the highest value of the annual produce in any one year was $156,000.

JOHN QUINCY WORKMAN was born in Allegheny City, October 7th, 1836. His parents were of Scotch-Irish descent. Compelled to earn his living at an early age, his education was very limited. His tenth year found him employed in the carriage manufactory of E. M. Biglow, in Pittsburgh, and five years later he was apprenticed to the same man to learn carriage-making. Before his apprenticeship expired he was made foreman. After attaining his majority he worked in several carriage manufactories as foreman and journeyman, and was for some years engaged in horse-trading and carriage-selling in the West. Conceiving the idea of establishing a business in his native city, he commenced it in a very humble way, and is now at the head of one of the largest and most prosperous carriage manufacturing industries in western Pennsylvania, and through all the many changes in its proprietorship his name has always appeared at the head of the firm. His life has been one of unflagging industry, and he taxes himself with more labor than he does any one of his employés. He is a thoroughly self-made man, a respected citizen and a kind and considerate employer.

MORGAN & ORR, Manufacturers of Mint Machinery, Philadelphia. In 1846, Joshua Morgan and Arthur Orr, both of whom had been for some time employés in the United States Mint, at Philadelphia, associated themselves as partners in business under the style of Morgan & Orr, and established their works at the present site, No. 1219 Callowhill street, Philadelphia. The premises occupied were, at the outset, but a small proportion of the space now devoted to their manufactory; but, as their business increased and as their means became more ample, there was a steady augmentation in the dimensions of their shops and constant improvements and additions to their machinery and tools. Their business is the manufacture of general machinery and iron work; their specialty, however, is the construction of fine machinery for mints, coining presses, milling machines, etc. Of necessity this must be exactly perfect in its every detail; and that such work, involving the greatest nicety, has been faithfully performed, there is no better indorsement than the contracts given and the approval of the same by the United States Government. At the commencement of the enterprise they employed but a few workmen; at present there are over 150 skilled artisans constantly occupied in these interesting and important works. The principal part of the machinery in the Philadelphia Mint, as, for example, the coining and cutting presses, and also the rolling and milling machines, were constructed by this firm. They also supplied the Branch Mint, at San Francisco,

with a full line of machinery, including the largest coining press in the United States (known as "The Ajax"); they had previously furnished the old machinery for this mint, as well as for the Branch Mint at Carson City, Nevada; and a large proportion of the machinery for the Assay Office at Boise City, Idaho, was also sent from these works. Foreign governments are also among the patrons of the firm. Three different mints in the neighboring Republic of Mexico have had their entire outfits supplied by them; and their productions are also in use at the mint in Chihuahua. In particular, one large coining press, made by them for the Mexican Government during the reign of the Emperor Maximilian, is worthy of especial mention. In some instances these machines had to be made in sections, so as to admit of transportation on mules in the mountainous regions of South America. The exactitude and perfection of their machinery has given them almost the exclusive control of this department of the machine trade. In addition to this special trade, they build all kinds of machinery, such as stationary steam engines, mining machinery, sugar machinery and all kinds of mill and boiler work. The engines also for the presses of the *North American* newspaper, Forney's *Press*, the *Evening Bulletin*, *Saturday Evening Post*, *Saturday Night*, the *Germantown Telegraph* and others were supplied by them. In 1857, the firm admitted Edwin L. Morgan as a partner. In 1868, Joshua Morgan, the senior member, retired, but the old style of the firm, Morgan & Orr, continues as heretofore.

JOSHUA MORGAN was born in Delaware county, Pennsylvania, in 1813. At the age of fifteen, he entered a blacksmith shop in his neighborhood, and, having spent his apprenticeship there, removed to Philadelphia and entered the extensive works of Levi Morris, now Morris, Tasker & Co. Here he remained some time, and then entered the Philadelphia Mint, and at this place his inventive mind and good mechanical powers came into service. In 1846, he and Arthur Orr (a machinist at the mint) founded the important works which bear their name. He retired from business in 1868.

ARTHUR ORR was born in Philadelphia, April 6th, 1817. He served his time with I. P. Morris & Co., and afterwards was employed at the Philadelphia Mint in making the coining machinery for the Charlotte Branch Mint, of North Carolina, and went thither to superintend its erection. Subsequently, having acquired a thoroughly practical knowledge of mint machinery, he, in conjunction with Joshua Morgan (a fellow-workman), started the works which to-day are so favorably known throughout the country, and of which he is the general superintendent. He is considered one of the most prominent and reliable machinists in the country, a warm friend to the young mechanic and a firm supporter of all scientific projects. He is an active member of the Franklin Institute, and his counsel and advice is most generally heeded in all matters relating to the advancement of American manufactures. He has been honored by the Wagner Institute of Science, of Philadelphia, with the honorary degree of Doctor of Mechanical Philosophy.

EDWIN L. MORGAN was born in Delaware county, in the year 1824. He was reared on a farm, but at an early age came to Philadelphia, and entered the hardware store of Richard Paxson & Sons, on Market street. Here he remained five years, and was most attentive to his business. In 1848, during the "California fever," he emigrated to this Pacific State, and at once engaged in mining. In 1852, he opened a general mercantile establishment. In 1856, he returned to Philadelphia, and in 1857 became a partner in the firm of Morgan & Orr, in which he still remains.

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PITTSBURGH FORGE AND IRON COMPANY: Alexander Speer, President; James H. Murdock, Treasurer; W. P. Porter, Superintendent. Office, No. 358 Penn street, Pittsburgh. This company was incorporated in 1864, with a capital of $50,000, which was expended in the erection of steam hammers and the other necessary machinery for the manufacture of railroad car axles and other heavy forgings. In 1867, the capital stock was increased to $200,000, when rolling mills were added to the works. Since that date other machinery has been obtained and other buildings have been occupied, as the trade demanded. The original amount of land purchased was about eight acres, which was on the Ohio river, south of Pittsburgh; and when the capital stock was increased, six more acres were acquired. By the erection of this and other works in that locality, the property has increased in value very materially. The company now have a frontage on the Ohio river of about 1000 feet, with the necessary landings. Railway tracks of the Pittsburgh, Fort Wayne & Chicago, of the Cleveland &

Pittsburgh and of the Pittsburgh & Erie Companies run immediately alongside the property; and they are also connected by switches with all other railroads terminating at Pittsburgh. There are manufactured at these works iron bars of all sizes, round and square, band and hoop, oval, angle and channel, fish-plates, track-bolts, hammered car axles and heavy railroad and steamboat forgings. The rolling mills produce yearly about 10,000 tons of iron and splice bars; and the forge yields 2000 tons of railway axles, railroad and steamboat forgings. The success which has attended these works since their commencement is due to their untiring efforts to produce a first-class article in their special lines.

ALEXANDER SPEER. A sketch of Alexander Speer appears elsewhere in this volume in connection with a history of the Globe Plow Works.

JAMES H. MURDOCK, Treasurer of the company, was born, 1840, in Wellsville, Ohio, and was specially educated with a view to business pursuits. He passed four years on the Western and Southern rivers, and also four years in the army. He removed to Pittsburgh in 1864, to assume the duties of the position he holds in the company.

WILLIAM P. PORTER, Superintendent, was born in Beverly, a town in Yorkshire, England, and received a very good education in a private school in Sunderland. While quite a youth he was apprenticed at the Bishop Weymouth Iron Works, in Sunderland, and served there until he attained his majority. During his apprenticeship he learned to be a first-class chain-maker and shipsmith, which was then and still is a very important and responsible branch of business. After his term of service had expired at these works, being of an adventurous disposition, he repaired to London, and for a brief period found employment on the Gravesend steamers, plying on the Thames between that port and London. But he soon tired of this occupation and returned to the north, where he obtained a position in the Berkley Iron Works, near Newcastle. There he remained two years, perfecting himself in iron forging. In 1843, he emigrated to the United States, being at this time a thorough master of his business. He landed in New Orleans, and at once re-embarked for Cincinnati, where he remained for seven or eight years, during which time he was well known as a successful forger of heavy iron work. He thence went to California, still pursuing his trade, with the exception of some six months in the mines. He remained about one year at the Vulcan Iron Works, California, and then returned to the Atlantic States. He now settled near Pittsburgh, and, leasing the Temperanceville Forge, commenced business on his own account, being principally engaged in the manufacture of heavy forgings. During the War of the Rebellion, his practical ability was frequently called into requisition, in executing heavy forgings for Government gunboats. This may be said to be his specialty. He would undertake contracts that had been refused by other manufacturers, and by his success in this branch he soon acquired a competence. Among others, he made the stern-post, as well as the rest of the heavy iron work, for the United States gunboat "Umpqua," which was built in Pittsburgh. Among his earlier efforts, and soon after his arrival in this country, was the forging of the iron for the United States steam sloop "Allegheny," which was constructed, 1843, in Pittsburgh, by Tomlinson, he being then in the employ of Eversham & Co. This vessel was taken down the Ohio and Mississippi rivers to the Gulf, and is now (1875) the Receiving ship at Baltimore, Maryland. In 1864, he organized the Pittsburgh Forge and Iron Company, of which he continues to be the superintendent. In 1874, he made a visit to his native land, and, among other pleasant reminiscences, had a long and interesting interview with his old master, who was then seventy-three years old. The meeting was alike enjoyed by both—by the former, who had so well instructed his apprentice, and by the latter, who had profited by such instructions, adding thereto his original talent and skill, until he had earned the reputation of being the most successful iron worker in western Pennsylvania.

WILLIAM H. BROWN, Coal Miner and Merchant, was born, 1814, in Westmoreland county, Pennsylvania, and is of Irish parentage. During his youth he received but a limited education. He labored on the farm until he was eighteen years old, and then began life as a common laborer, so continuing until he reached his twenty-first year. He then went to Pittsburgh and embarked in the coal business in a small way. Being most industrious and persevering, and possessing excellent business qualifications, he throve apace, continually extending his operations, until he now stands at the very front of coal operators. He commands a patronage

second to no one, and has customers in almost every State in the Union for coke, coal and iron. He operates his own mines in the Monongahela Valley, and these extend along the river of that name from Pittsburgh to Monongahela City, a distance of thirty-five miles. He likewise owns about 500 barges, used for the transportation of his products.

BAILEY, FARRELL & CO., Manufacturers of Plumbers' Materials, Water, Gas and Steam Pipes, etc., etc., Pittsburgh. This business, the oldest of its kind in Pittsburgh, was established in 1820, by George Bailey, father of the present senior partner. It is not known if the premises first selected by him were the same as those now occupied by the present firm; but it is certain that his practical knowledge and application laid the foundation of a most important branch of industry. In 1858, the management passed into the hands of the present proprietors, who have fully sustained the reputation of the founder. Their perseverance against competition—which did not exist to such an extent when the business was started—and the stand they have since taken, prove conclusively that they are in every way worthy to succeed the enterprising founder. Their ample works, located at No. 167 Smithfield street, contain all the appliances for their manufactures. They have a frontage of 40 feet, with a depth of 120 feet; and a factory in the rear, 60 feet wide, and extending in depth 125 feet, thus affording the necessary accommodation. The main building, on Smithfield street, is four stories high, with a basement, which is used for the storage of iron pipe, cast iron sinks, etc. The first floor is occupied by the offices; the second constitutes the wholesale storage room; the third is filled with pumps of every description, while the fourth is applied to the storage of plumbers' material, bath-tubs, copper ware, brass goods, etc. The factory, in the rear of this building, is a fire-proof structure, four stories high, with a basement in which is a large steam engine of 150 horse power, as well as a rolling mill for the manufacture of sheet lead. On the first floor is located the shipping-room, the storage of lead pipe and sheet lead, and the machinery for the manufacture of the latter. The second floor is the machine room, where all the tools required in the manufacture of brass wares and the designing of patterns are made. The third floor is perhaps one of the most interesting, as this is the brass department, where every description of goods in that metal is made, whether for water, gas or steam purposes; and the number and variety of these objects are so great that even the casual spectator is fairly bewildered at the immense display. The fourth floor contains the brass foundry and stock room. To keep pace with the requirements of this establishment a force of fifty hands is constantly employed, involving, with the material stored, a very heavy amount of capital. All the members of the firm are practical men, and attend personally to the details of the business. They dispose of their goods only by wholesale, and solely to the trade. Their wares are shipped to all parts of the United States. Their long connection with the business and their experience in adapting machinery to the several uses required, enables them to successfully compete with Eastern factories, and establishes the fact that at least one Western manufactory solves the problem of cheap and good production. Two fires occurred in June, 1870, and the works were afterwards reconstructed on an improved plan.

GEORGE BAILEY, the founder of this establishment, was a native of Cheshire, England, who emigrated to the United States in 1819, and settled in Pittsburgh. Possessed of but little or no capital, and the demand at that early day for articles needed for water, gas, or steam pipes, etc., being very limited, the prospect to him seemed anything but bright. But, by hard personal labor and a thorough knowledge of the business, he succeeded in establishing a fair and rapidly increasing demand for a class of goods then considered luxuries, which, in the present day, are known to be actual necessities. No modern dwelling would be complete without its complement of gas, water, or heating appliances. No branch of the arts has made greater strides towards perfection during the last quarter of a century than has been effected in the manufacture of these goods, and western Pennsylvania, through the house which he founded, has just claims for a fair share of such advancement. The first sheet lead rolling mill was set up by this firm, who introduced the manufacture of lead pipe by new and improved machinery; and this house also invented and perfected machinery for manufacturing pressed bar lead, Pittsburgh having hitherto depended upon St. Louis for a supply of these articles. This house was likewise the first in western Pennsylvania to manufacture a full line of brass goods and to possess the capacity to meet the requirements of the plumbers, gas and steam fitters in their locality.

MITCHELL, STEVENSON & CO., Stove Manufacturers, Pittsburgh. This house was originated by Thomas Mitchell, who, while an apprentice, purchased a lot on the banks of the Allegheny river, in the place known as Bayardstown, where, in 1826, he laid the foundation of the present large establishment. He took into partnership with him Thomas and Campbell Sweeney and Sterling Cuthbert; the style of the firm being Cuthbert & Co., and the business carried on was the manufacture of mill and machinery castings, gas and water pipe. The business was started on a small scale, the partners all personally laboring; but it grew rapidly, and they extended their business in this branch until 1836, when the firm dissolved; the Sweeneys and Cuthbert retiring and removing to Wheeling, believing that locality would prove the city, while Pittsburgh would be the village. The business was then conducted by the firm of Cuddy & Mitchell, who had purchased the interests of the retiring members. The new firm continued to prosper and still further increase their business. In 1838, they opened the present warehouse, but in a building far inferior to the present fine structure. In 1840, the firm again changed, and was thereafter styled Pennock & Mitchell, who transacted a very large business in gas and water pipe, which they made a specialty. In 1845, J. B. Herron—brother-in-law of Thomas Mitchell—entered the firm, which now was termed Pennock, Mitchell & Co., and so continued until 1855, when the senior partner retired and William Stevenson entered, the style of the house being known as Mitchell, Herron & Co. The new firm, at this date, commenced the manufacture of stoves in addition to their other goods; gradually working out of their former line and producing more stoves. In 1859, James H. Mitchell became the junior partner, the style of the firm remaining unchanged. In 1864, J. B. Herron retired and Thomas S. Mitchell entered the house, the name adopted being the present one of Mitchell, Stevenson & Co. By this time the business had gradually drifted into stoves exclusively. The works are situated at the corner of Fourteenth and Etna streets, on the Allegheny river, and about 100 hands are employed, who manufacture stoves to the amount of $250,000 per annum. Their wares comprise cooking, heating, and parlor stoves of all descriptions and sizes. The firm have recently added a soft coal and base-burning stove, which is pronounced to be the most successful of its kind ever invented. It has received the first prize wherever brought into competition, and has given perfect satisfaction. As an evidence of this, it may be stated that of 1200 sold during the past year (1873), but six were complained of. This description is one of their specialties, and the "Revolution"—as it is termed—is undoubtedly destined to greater success in the future. The goods are shipped principally west from Pittsburgh, and almost to California. The office is 194 Liberty street.

THOMAS MITCHELL, founder of the firm, was born, 1796, in Middleton, Ireland, and arrived in the United States in 1818, and proceeded to Pittsburgh, where he entered the McClurg foundry as an apprentice to learn the business: this was the first establishment in the city. He there learned the trade which proved so remunerative to him in after years. He served as a member of City Councils, and was highly respected by every one. He took a great interest in political matters, and was firm, inflexible, and frank, ever siding with the right and weak. He was scrupulously honest and of the strictest integrity. He was married to Mary Herron of Pittsburgh, and he died in 1871, leaving four children, three sons and a daughter. He was a self-made man, and accumulated the large fortune of $500,000, which he has left in the keeping of well-trained, careful children, who, while they know how to enjoy life, give no heed to the extravagances of the age. The two sons who are members of the firm are hard-working men. His daughter is the wife of the Rev. James B. Whitten (United Presbyterian Church).

JAMES H. MITCHELL was born, February 1st, 1838, in Pittsburgh, and is the eldest son of the late Thomas Mitchell. He was brought up in the firm, and displays many of the finer qualities which made his father so successful a man. He is the superintendent of the works. He was married, July 10th, 1860, to Susan Young of Pittsburgh, who died in September, 1861. In September, 1865, he married Nancy Duncan, also of Pittsburgh.

THOMAS S. MITCHELL was born, April 12th, 1840, in Pittsburgh, and, like his elder brother, was brought up in the firm. He has charge of the financial department of the house. He made the "Address of Welcome" at the Convention of the National Association of Stove Manufacturers, held at Pittsburgh, February 10th, 1873, which was considered by all who heard it to be particularly felicitous in character and ably delivered. He served as Secretary of the Convention. He was married, September 5th, 1861, to Mary O. Lowell of Philadelphia.

WILLIAM STEVENSON was born, 1823, in Pittsburgh, and was brought up in the dry goods business. He entered the house in 1855. He is a very active, energetic man, full of enterprise and business. He was married, August 22d, 1862, to Helen Hann.

EXCELSIOR FLINT GLASS COMPANY was founded in October, 1863, by a number of operative glass blowers, forming a private partnership, the members of which were John Lowery, John Flynn, Edward Dithridge, —— Ziebler, Anthony Snyder, —— Walters, —— Rhinehart, James Lindsay, and James M. Lindsay, the latter being Treasurer and General Financial Manager. The works are located in the Fourteenth Ward of the city of Pittsburgh, the building being 120 feet square, one and two stories in height. The company for the first three years of their existence manufactured flint lamp-glass chimneys solely; to this they subsequently added silvered glass ware. The works are one of two or three which adhere to the manufacture of pure flint or lead glass. It is composed of lead, pearlash, and nitrate of silver. The establishment continues at present to manufacture it largely. In 1866, W. C. Robertson became connected with the company, and until his death acted as its presiding officer and financial manager. Previous to his advent the company disposed of their products through agents; since that time they have maintained a warehouse at No. 8 Wood street, and sell direct to the trade, employing no agents whatever. Their customers extend into Canada on the north, to Galveston in the south, and from Boston in the northeast to San Francisco in the west. Since the new connection with W. C. Robertson was formed, the company have been enabled not only to purchase their works, but also the contiguous property. They have one 10-pot furnace, melting capacity thirty pots per week. They originally employed seventy-five hands; now they have 125 workmen, and pay out wages over $1200 weekly. They consume about 200 bushels (over seven tons) of coal daily, and make about 450 gross of chimneys in a week—the amount of manufactures having increased fourfold since it originated—and the cash value of their products yearly amounts to $180,000. In 1866, the property was estimated to be worth about $20,000. It has been increased to such an extent that now it is considered to be the leading house in the country, and to produce the finest lamp chimneys which it is possible to make. They attribute their success to confining their manufacture to a first-class article only. The glass is all hand made. There were originally eleven members in the company; of these five remained in 1874—William C. Robertson, President; George R. Robertson, Treasurer; John Flynn, Foreman and Manager; John Lowery, clerk at the works, and Anthony Snyder, private partner.

WILLIAM C. ROBERTSON, the late President of the company, and the most prominent of the firm, was born, 1819, in Scotland, and came to the United States when about nine or ten years old. He received his primary education in Delaware City, Delaware, closing with Newark College, Delaware, where he graduated. After leaving college he removed to Pittsburgh, and was for some time a clerk, and afterwards interested in a steamer. He returned to Delaware City in 1845, where he embarked in the coal and lumber business, which he carried on until 1860, when he disposed of the same, and then started and operated a steam flour mill. This he sold in 1865, when he again removed to Pittsburgh, and commenced in the following year his connection with the Excelsior Flint Glass Company. He was President of the Fifth Avenue Bank for a period of two years, but was obliged to resign the same, as his own immediate business in the glass company demanded his entire attention: he, however, continued to be a heavy stockholder in the institution. After his death, in 1874, his interest in the glass company was transferred to his widow, Mrs. N. R. Robertson.

GEORGE R. ROBERTSON, Treasurer, was born, 1849, in Delaware City, Delaware, where he was educated in private schools and academies until 1865, when he removed with his father to Pittsburgh. He was for four years clerk in a factory, and, in 1869, went into the general commission business. In this he remained until 1871, when he acquired an interest in the Excelsior Company, which he still retains.

PENN COTTON MILLS COMPANY, Allegheny City. This company is one of the three that absorb the cotton manufacturing interest of Allegheny county. It was organized and the factory building erected in 1845, and the machinery was introduced and operations commenced the following year. The factory building is located on River avenue, near the edge of the Allegheny river, and about a stone's throw above the suspension bridge.

The original company was composed of the following partners: Robert Kennedy, W. S. Kennedy, Harvey Childs, Asa P. Childs, Sidney Strong, John T. Logan, and Thomas M. Howe—the latter a silent partner. Sidney Strong became the managing partner, which relation he held for fourteen years, when, in 1859, his interest was purchased by D. C. Clapp. The interest of John T. Logan (now deceased) had been purchased by William Bagaley a few years previously. The company has been known as Kennedy, Childs & Co. since its organization, and the two changes just noted are the only ones that have taken place in the firm in that time. D. C. Clapp became the managing partner in 1859, and has ever since held that position. He is the only one of the firm who gives his personal attention to the business, and is always to be found in the handsome offices of the company, adjoining the main building. The number of operatives employed when the mills are in full operation is about 300. Many of the latest and most important improvements in machinery have been introduced. There are 112 cotton cards and 8844 spindles, which furnish material for 227 looms. The average consumption of cotton is sixty bales a week, or about 3000 a year. The principal manufacture is 4-4 sheeting.

BYERS, McCOLLOUGH & CO., Manufacturers of Bar, Sheet, and Skelp Iron; also of Wrought-Iron Welded Tubes for Gas, Steam, and Water, Pittsburgh. The business carried on by this firm was founded, in 1864, by A. M. Byers, in connection with his partners at that time. They purchased a square of ground on the south side of the Monongahela river, fronting on Bingham street, between Sixth and Seventh streets, having a river frontage of over 500 feet, upon which they erected a rolling mill, and also a mill for the manufacture of wrought-iron pipes. It will thus be seen that this firm possess a great advantage in the manufacture of wrought-iron tubes (one of their specialties), in being fully prepared to make their own iron into such sizes and shapes as are required for the production of tubes; there being but one other firm in the United States who manufacture their own iron for this special purpose. The capacity of their mills is about seventy tons of finished sizes of iron and tubes per day; and when running to their full extent they give employment to between 450 and 500 men and boys, requiring a capital of $1,500,000. William McCollough became connected with the firm in 1868, having formerly been one of the firm of Jones, Boyd & Co., the pioneers in the manufacture of cast steel in this country. In 1870, E. M. Byers—who had been in the employ of the firm since its organization—purchased an interest in the business. The senior partner is also interested in the manufacture of pig-iron, owning a controlling interest in one of the largest blast furnaces in the country, in which the Lake Superior ores are used. The product of this furnace is from fifty to sixty tons of pig metal per day, and is very largely used by the firm at their rolling mill.

A. M. BYERS, the senior member of the firm, was born, 1829, in Mercer county, Pennsylvania. From an early day he became connected with the manufacture of iron, and when but sixteen years of age was employed to superintend a blast furnace in his native county, where he had, perhaps, greater advantages for gaining a thorough knowledge of the manufacture of pig-iron from the raw material than furnace men of the present day possess. In those early days of iron production, west of the mountains, the furnace company dug their ores from the surrounding hills, usually having to strip from fifteen to twenty feet of earth for a ten or twelve-inch vein of ore, which would yield only twenty-five to thirty-five per cent. of iron in a blast furnace. They chopped their own wood and made their own charcoal for the smelting of the ores, and also mined the coal which was subsequently used in the furnace. In this connection it may be stated that this furnace was the first west of the mountains to practically demonstrate the successful use of raw bituminous coal for the smelting of ore in blast furnaces, without first coking it. Another fact worthy of note is, that at this same furnace the first Lake Superior iron ores were smelted, in 1848 or 1849, under the supervision of A. M. Byers. A few hundred tons of that ore had been brought by steamer to Erie, and by canal boat to the furnace, according to the instructions of David Himrod, for trial, the furnace being owned by Vincent, Himrod & Co., of Erie, Pennsylvania, by whom he had been appointed superintendent of the furnace, and with whom he remained until 1850, when he removed to Pittsburgh and went into the house of Spang & Co., of which James McAnley, the business man, was his cousin. The following year (1851) he went to Cleveland, Ohio, to take charge of a branch house of Spang & Co., where his opportunities for acquiring a knowledge of the mercantile branch of the iron business was very extended; he made the sales, besides travelling and collecting for both houses, thus forming a very large acquaintance in all the principal cities in the West. He

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returned to Pittsburgh, in 1857, as Spang & Co. retired from business, having leased their mill and disposed of their entire stock and business to Spang, Chalfant & Co., of which firm he was now a member. He remained in that house—who were manufacturers of iron in all its branches—until 1864, at which date the partnership expired by limitation, when he disposed of his interests therein to his partners, and, during the same year, purchased the real estate, erected the mills, and founded the house of Byers, McCollough & Co. He is well known among the manufacturers of western Pennsylvania, and by the business community generally, as a man of great experience and a skilful financier.

WILLIAM McCOLLOUGH was born, 1821, in Beaver county, Pennsylvania. He went to Pittsburgh in 1844, and after acting as a clerk in a grocery house for a year and a half, entered the employment of Jones & Quingarcher, steel manufacturers, with whom he remained for eleven years as clerk and manager, and for eight years as a partner. When the firm was changed to Jones, Boyd & Co., he purchased an interest as partner, and the co-partnership existed for eight years. They finally disposed of the business to Anderson, Cooke & Co., and he then retired from active mercantile life until 1864, when he became a partner with A. M. Byers.

THOMAS BAUMGARDNER, Coal Merchant and Miner, was born in York, Pennsylvania, December 20th, 1816, and is of German extraction. After passing several years in the schools of his native town, he moved to Carlisle, Pennsylvania, where he entered the store of Thomas C. Lane, as clerk, with whom he remained for five years. He then repaired to Lancaster, where he found employment in the dry goods establishment of Henry B. Carson, and, at the expiration of eighteen months, purchased an interest in the business, and, until 1840, was associated in partnership with his former employer. At this date, he bought the property at the northwest corner of North Queen street and Centre Square, in that city, and entered into the dry goods business on his own account. Subsequently, he associated himself with his brother Henry, in the coal trade, prosecuting that calling in connection with the other. In 1852, he disposed of his original business, and greatly extended his field of operations in the last-named trade, opening his present extensive yard, on North Prince street. Since that date, his trade has rapidly and constantly increased and prospered, until he is now recognized as the largest and most enterprising coal merchant in the city. He is also the most extensive mining proprietor in the Shamokin Coal Basin. He was the first man to develop the mining interests of that section, commencing the "Henry Clay" colliery as early as 1856, at the town of Shamokin, which he operated for ten years, producing annually 60,000 tons of coal. He then became interested in constructing the "Brady," the "Reliance," the "Enterprise" and the "Daniel Webster," and purchased the "Ben Franklin," each of which yielded about 60,000 tons per year. The "Reliance," "Enterprise" and "Ben Franklin," with the "Margie Franklin," are still most successfully operated by him. In 1871, the slope of the "Enterprise" was continued to an additional depth of 300 feet, and about the time of its completion its supports were crushed in by the enormous weight above. These gave way, the entire slope was filled, entailing an expenditure of over $40,000 and occupying until July, 1874, in its reconstruction; it is now the most successful and productive colliery in the State, yielding about 15,000 tons per month. The slope is of the most permanent construction, 620 feet deep. The coal is drawn up the slope by a stationary engine, and thence by locomotive to a double breaker, distant about 1200 feet. The vein is about 9 feet thick, and slopes at an angle of 45° north. The supply seems inexhaustible, and the value of the mine can scarcely be estimated. The "Reliance" is 4 miles distant, at Mt. Carmel, on a branch of the Reading R. R. It has a depth of slope of 500 feet and is most securely constructed. The coal is carried to a double breaker, and it produces about 12,000 tons per month. It is of the best quality of white ash, and commands the highest market price. The operating force at each of these collieries is about 110 men and boys; both mines are constantly worked to their full producing capacity. The "Ben Franklin" is located in the Mahanoy Valley, eight miles south of Shamokin, is of the red ash variety, and of superior quality. This is also worked to its full capacity, yielding some 8000 tons per month, and giving employment to a force of seventy-five hands. But not only is he largely interested, as will be seen above, in the development of coal, but he has been and still is engaged in other enterprises of solid and remunerative results. One of these is the Sand Mining Industry of Lewistown, Mifflin county, this being a deposit of white flint sand, which has no equal in the United States for the manufacture of glass. It is shipped in large quantities to Pittsburgh and Wheeling, and commands a high price. The

amount forwarded to those points now reaches 1000 tons monthly, and only the lack of transporting facilities prevents an excess of those figures being shipped. He is also a holder of various large interests in the iron founding business of Pulaski county, Virginia. He is a member of the firm of Shenk, Bausman, Carpenter & Co., owners of the "No. 4 Cotton Mill, Lancaster." He built and was the principal owner of the Junction & Breakwater Railroad, in Delaware, an enterprise he recently sold to the "Old Dominion Steamship Company," while retaining an influential share in its management, and acting as Director. In this connection it may be observed, that when he commenced coal mining operations, there was not a railroad in that portion of the Shamokin Valley, and he built the first line ever constructed in that region—the "Enterprise Railroad"—and, until it was consolidated with the Reading Railroad, officiated as its President. That is, excepting the old Pottsville & Danville Railroad, which was built of strap iron, and was not successful; he constructed the first successful road in the region. A noteworthy incident in his coal mining operations is that the "Margie Franklin" colliery was burnt during the miners' strike of 1871, but rebuilt by him in a short time. In the Lancaster County Bank, in the Lancaster Bank and in the Lancaster Savings Institution he has been a valued director; and at the present time occupies the same position in the Northumberland County National Bank, in the Lancaster Fire Insurance Company and in the Reading & Columbia Railroad. He is President of the Enterprise Coal Company, and has held that position also in other similar corporations. In the Philadelphia & Sunbury Railroad he has been an influential director.

ATLANTIC IRON AND NAIL WORKS, Kimberly, Carnes & Co., Proprietors, Sharon, Mercer county. This establishment was erected by the present owners, in 1867, and is located on a tract of fifteen acres of land, situated on Sharpsville street in the borough of Sharon. On the premises there is a blast furnace, a rolling mill, and a nail works. The total length of the several buildings, including the blast furnace, is 600 feet, with an average width of 100 feet. In the rolling mill there are twenty-eight boiling and seven heating furnaces, and five trains of rolls, which are propelled by four steam engines. Here are manufactured bar, plate, hoop, and rod iron to the extent of 15,000 tons annually. In the nail works are forty-six nail machines, with the capacity of producing 2300 kegs of nails per week. In connection with the works are carpenter and blacksmith shops, and a keg factory; also forty tenement houses for the accommodation of their operatives. About 450 hands are employed in and around the works. The establishment is situated on the line of the Erie & Pittsburgh Railroad, affording first-class facilities for the delivery to the works of supplies needed therein, as well as for the shipment of its various products. The firm are the owners of a colliery, where sixty men are employed, who mine 100 tons of coal per day

PHILADELPHIA FURNACE AND ROLLING MILL, Stephen Robbins & Son, Philadelphia. This establishment is located at Beach and Vienna streets, directly on the right bank of the Delaware river, in the Eighteenth Ward of the city of Philadelphia, and was finished in 1873, having been blown in during December of that year. The height of the stack is 58 feet and the diameter 14 feet, the estimated annual capacity being placed at 8000 tons. The furnace has all the latest improvements, and is of approved pattern. The ores used are hematite and magnetic, and a large portion of the product is used in the rolling mill adjoining. This is the first blast furnace yet erected in the city of Philadelphia, and will test the policy of bringing fuel, ores, and limestone to tide-water, whence the product can be shipped to Eastern and other markets. The puddling furnaces and rolling mill had already long been established on the property, but were dependent for pig-iron on distant furnaces and an ever-varying market. The proprietor, by extending his piers to the Port Warden's line, has obtained ample space, before the navigation is closed by ice, for storing large quantities of ores, coal, and limestone. The slag is disposed of in various ways, such as filling up lots and pier-heads, grading streets, etc., and a movement is on foot to manufacture it into regular blocks for building purposes. The stock house is situated near the landing, and is 200 feet long and 60 feet wide. Here the ores are assorted, and they, as well as the limestone and coal, are convenient to the pneumatic lift, the platform of which extends near to the rear of the furnace, and carries two barrows at a time. To the right or north of the furnace are the hot-blast ovens, the boiler room, and the engine room, which latter fronts on Beach street. Directly in front of the furnace, facing the

street, is the east-house, 40 feet by 60, while the cinders are run out on the other side. Four boilers, with four "mud drums," supply steam to the engine; each boiler is 65 feet long and 3 feet in diameter, and is heated by the gas from the furnace. The upward, direct-acting blowing engine weighs 67 tons; the diameter of cylinder is 44 inches and has a stroke of 4 feet. The blowing cylinder, which has 12 receiving and 12 discharging valves, is 7 feet in diameter. The two fly-wheels are each 15 feet in diameter, and each weighs 15 tons. In the rolling mill adjoining, bar and merchant iron is manufactured; and the annual average capacity is 8000 tons.

STEPHEN ROBBINS was born in 1820, in Philadelphia county. He came to the city of Philadelphia in 1842, and was engaged for several years in the iron and steel business, and in 1857 commenced the operations at Beach and Palmer streets, which he still carries on, as described above. In July, 1873, John T. Robbins was admitted as partner in the firm.

AMERICAN IRON WORKS, Jones & Laughlins: Office and Warehouse, Second and Third avenues and Try street, Pittsburgh. Some time previous to 1852, the firm of Jones & Lauth were engaged in the manufacture of iron, and with them was associated James Laughlin, as special partner. In 1852, Mr. Lauth retired, and the firm became Jones & Laughlin. This establishment is one of the largest, if not the largest, miscellaneous rolled iron works in the United States. The specialty is cold-rolled shafting, piston rods, mower and reaper finger-bars. The process is a peculiar one, patented by Lauth, and the patents are now owned by the firm of Jones & Laughlins. By the use of powerful and peculiarly constructed machinery they have succeeded in rolling and drawing bars, rods, plates and sheets of iron and steel, while cold, into any of the shapes ordinarily given to hot iron by rollers. The effect of this process is to compress and pack together the fibres of the metal to such an extent as greatly to increase its strength, hardness, elasticity, etc., as shown by experiments and tests made by the most eminent engineers of Great Britain and the United States. It also produces a highly polished and perfectly smooth bright surface, and finishes the bar or rod as straight and true as if turned in a lathe or planed. The patent cold-rolled knife-backs and finger-bars, for reaping and mowing machines, have greater strength, more rigidity and increased elasticity than any other finger-bars in use. The material is homogeneous, and entirely free from the hardness or brittleness of the carbonized bars. They are easily drilled or planed, and perfectly uniform in shape and dimensions. The firm have secured also the exclusive right to manufacture "Collins' patent self-adjusting double compression couplings," which are justly celebrated as being simple in construction, self-adjusting and perfectly adapted for the required purpose. The cold-rolled shafting manufactured by them is extensively used throughout the United States and abroad. It took the first prize—a gold medal—at the Vienna Exposition, in 1873, as being by far the best exhibited. The mill was destroyed by fire in January, 1872, but was immediately rebuilt, the firm, meanwhile, running their machinery exposed to the winter weather, and having the works enclosed and in full running order during the March following. There were also boiler explosions, doing considerable damage; these occurred both in 1872 and 1873. This establishment may be considered the representative works of Pittsburgh; the product is about 30,000 tons of merchant iron and cold-rolled shafting annually.

ELIZA FURNACES: Laughlins & Co. The firm was established in 1858, by James Laughlin, the junior partners being the same as are at present embraced in the firm of Jones & Laughlins. At that date one blast furnace was erected (the first in the city limits), to which another was added a short time afterwards. The stacks are 45 and 60 feet in height; and the boshes have a diameter of 13 and 17 feet. Both bituminous coal and coke are employed to reduce the ores, which embrace the Lake Superior, the magnetic and the hematites. The average annual capacity of these furnaces is stated as 20,000 tons of pig-metal; the actual yield for the year 1872 was 20,239 tons. The products of these furnaces are chiefly consumed by the firm of Jones & Laughlins.

PENNSYLVANIA IRON WORKS, Waterman & Beaver, Proprietors. These are old and extensive works, having been first established in 1845, and include four blast furnaces, two puddle mills and a rail mill. Three of the furnaces are at Danville, Montour county, and one at Chulasky, Northumberland county, Pennsylvania. The Danville furnaces are of 34 and 50 feet in height of stack,

and the boshes are 14 and 16 feet in diameter. The ores reduced here are the fossil and the Cornwall magnetic. Their average annual capacity is placed at 25,000 tons. In these several furnaces there are annually consumed 65,000 tons of ore, 25,000 tons of limestone and 50,000 tons of coal. It is worthy of record that the first T rail and the first 30 foot rail ever made in the United States were rolled here; also that the first railroad iron in this or any other country was manufactured here by means of anthracite coal. The annual capacity of the works prior to 1873 was 28,000 tons of rails; during that year improvements and additions were made, so as to be able to turn out 40,000 tons during the same period. There are 1400 hands employed in these works, and the amount of wages paid yearly is $1,000,000 to $1,500,000. There is a landed estate belonging to the works of 3000 acres, with 300 tenement houses for the use of operatives.

ANCHOR COTTON MILLS, Birmingham, Watson & Co., Pittsburgh. These mills were established by Blackstock, Bell & Co., many years since, who operated them for a while and then ceased. After remaining closed for a period, the present firm purchased the property, in March, 1873, and commenced the manufacture of brown sheetings, battings and carpet chain, employing 250 hands. The mills are located on Robinson street, in the city of Allegheny, and contain 8192 spindles. The amount of capital invested is $100,000, and the product of the goods manufactured was $140,000 during the first year.

NICHOLAS J. BIGLEY, Coal Merchant and Miner, was born, February 18th, 1821, in Hathville, Province of Lorraine, France, and is of German descent, his great grandfather having settled in France. In 1828, his father emigrated to the United States, and settled in New York, where he resided for two years; and, having purchased land in Buffalo, removed thither, but shortly becoming dissatisfied, on account of the Indians, who then prowled about that neighborhood, he disposed of his lands and returned to New York, remaining there until 1832, while his son, Nicholas, went to school there. In the latter year the family removed to Pittsburgh, where the son continued his studies until he attained the age of sixteen, when he joined his father, who had purchased a farm on Pine creek, and assisted in the cultivation of the same. He remained there for some time, and was then indentured to learn the trade of a blacksmith with the now veteran Captain Joseph Vandergrift, one of the pioneer boatmen of the western waters. He served an apprenticeship of three years, and after about ten years of the hard labor incidental to that period, he commenced business on his own account by purchasing an interest in a small tow-boat called the "Walter Forward;" had charge of her for about two years as captain, and a part of the time as pilot, working very hard. Having made some money, he disposed of his interest in the craft and engaged in the coal business in a small way; this was in the autumn of 1846. He floated coal in boats down stream in search of a market. The business was then in its infancy, little indicating the magnitude it has since attained. He continued to float coal to Cincinnati, Louisville and New Orleans, and intermediate ports, up to the spring of 1849, when he entered into co-partnership with a then prominent and well-known coal merchant, Daniel Bushnell, a gentleman whom he ever regarded as a man of honor and of the strictest integrity. In May, 1849, they opened a wholesale and retail coal yard in Cincinnati, at the southeast corner of Water street and Western Row, now known as Western avenue, under the firm-name of Robert Hazlett, Jr., & Co., besides floating their boats in the usual way. In the fall of 1850, they contracted for the building, at New Albany, of a side-wheel steamer called the "Black Diamond." She was supplied with three boilers, double-flued, and two engines, with 18 inch cylinders and 7 feet stroke. This boat made her first trip in March, 1851, and Captain Bigley commanded her for about eighteen months, during which time his partner, Daniel Bushnell, managed the Pittsburgh end of the business, and Robert Hazlett, Jr., the Cincinnati branch. Towards the close of 1852, the latter partner disposed of his interest in the business to the other partners, when the charge of the Cincinnati branch devolved on Captain Bigley, the firm now being known as Bigley & Bushnell; and the latter's son, Joseph Bushnell, was given a small interest in the business. Captain Bigley, in the spring of 1856, disposed of his interests in the firm, and in connection with Samuel Coit, of Hartford, Connecticut, built the steamer "Hartford City," for use as a harbor boat in Cincinnati. In May, 1857, he purchased an interest in the Pittsburgh and Youghiogheny Coal Company, which corporation included among its shareholders the late J. Edgar Thomson, Colonel Thomas A. Scott, George

W. Cass and other prominent men. This company built the tow-boat "Alps," which was then the largest tug on the western waters, and Captain Bigley towed coal with her to Cincinnati and Louisville up to 1859, when the Pittsburgh and Youghiogheny Coal Company sold out the steamer and barges, McDonald & Bigley becoming the purchasers. This new firm then owned the "Alps" and "Hercules," steamers. In 1862, a division of the floating property was made, and Captain Bigley received for his share the steamer "Hercules," barges, and all the coal then loaded in barges and boats, and he continued the business on his own account. During the War of the Rebellion, the transportation of coal by river was a most hazardous business. On February 18th, 1863 (his forty-second birthday), he was on the steamer "Hercules," with seven barges in tow, containing 145,000 bushels of coal, when the whole concern was captured by a band of rebel guerillas on the Arkansas shore, opposite Memphis, Tennessee. They fired the steamer, which was destroyed, as was likewise one of the boats, which took fire and sank. The captain and crew, except one who was killed by the desperadoes, were marched into the interior twelve miles and subjected to every indignity, besides being threatened with death. Captain Bigley had, previous to being marched ashore, dropped his pocket book, containing $5000 in greenbacks, into one of the pump-boxes of a coal boat, whence, after being paroled, he recovered it somewhat soaked. There were six boats still lying on the shore undisturbed, of which two were saved by being towed across the river by the unwilling captain of the tow-boat "Wisconsin," then lying at Memphis, who made two trips for the purpose when night came on; he might easily have towed the whole fleet at once. The guerillas during the following night scuttled the four remaining barges and cut them loose, so that they became a total loss. The entire loss of Captain Bigley by this capture was $48,000, besides $1284 which he had given his clerk the day previous to the capture for the purpose of paying his crew. This sum the rebels "appropriated." The loss incidental to this misfortune was very great indeed, as tow-boats could not be replaced at that time, all kinds of crafts being held at figures double or treble their value, owing to the scarcity and the great demand. At present he is still engaged in the coal and coke business, has five steamers used exclusively for towing coal of his own mining, and owns a large fleet of barges. His principal coal mine is located in the celebrated gas-coal region, at Alpsville, on the Youghiogheny river and on the line of the Pittsburgh & Connellsville Railroad, at twenty-one miles distance from Pittsburgh. He manufactures coke largely at Alpsville, and uses in connection with the ovens a patent washer for the washing and desulphurizing of stock from his mines. The result is highly satisfactory, the coal being entirely freed from slate and sulphur, and left almost the pure carbon. The washer now used by him was the first built in this country, and cost over $11,000.

PENNSYLVANIA TACK WORKS were chartered June 28th, 1867, but were put into operation as an individual enterprise in January of that year by Captain Charles P. Weaver, and located in an old building at the corner of Ford and Lafayette streets, Norristown, Montgomery county. In April, 1867, Captain Weaver associated with him Aaron F. Baker, under the firm-name of C. P. Weaver & Co., and they continued to operate in the old mill until it became necessary to increase its dimensions. Accordingly, the firm purchased, July 30th, 1870, a property of Jacob Freedley; another, August 1st, 1870, of Isaac Shaw—the latter, a spinning mill previously occupied by Littlewood & Co., located on Stony creek. This building was replaced by a more substantial structure during the autumn of 1870, and the firm removed to the new works, January 1st, 1871. On February 1st, 1872, William P. Culbertson purchased the interest formerly owned by Aaron F. Baker, and this co-partnership, still known as C. P. Weaver & Co., continued to operate the works until June 5th, 1873, when William P. Culbertson withdrew, and the firm was dissolved. The interest of the retiring partner was purchased by William H. Sowers, of Philadelphia, and Rev. J. Grier Ralston, D. D., LL. D., of Norristown, and an organization was effected under the original charter, July 1st, 1873, as the Pennsylvania Tack Works, with double the original capital: J. Grier Ralston, President; Charles P. Weaver, Secretary and Treasurer; and these two gentlemen, with William H. Sowers, directors. The increasing demand for goods has obliged the company to order more machines, and they are constantly adding to the capacity of their works. Most of their machines were built in Massachusetts, and all are of the most approved patterns. They are now having machines made after their own designs, by C. Rittenhouse, of Norristown. The buildings occupied by the company are erected with regard to the strength required for the operation of heavy machinery. Two boilers, 36 feet

long and 30 inches in diameter, furnish the necessary steam to a fine twenty-five horse power horizontal steam engine, which drives the machinery. This consists of thirty-eight tack and two shoe-nail machines, of which ten are employed on three-penny fine and finishing nails, and yet they have no stock on hand. There are over 375 different grades and sizes on their shelves, from the 2½ inch nail to "D tack," about the one thirty-second of an inch in length. Each machine makes 280 revolutions per minute, each revolution forming a perfect tack. They have altogether a capacity of one and a-half tons per day. The factory is a model of system and neatness; and, in the plans for the perfection of the work, the comfort of the employés has been wisely considered. There is evidently a strong chord of sympathy between the company and their hands, and many of the latter have been retained since the establishment of the works. The products are second to none in the United States, in the quality of material, style of finish, or cheapness; and by their own intrinsic merit have steadily gained in public favor. The ability, energy and experience of the members composing the company are sufficient to guarantee the full realization of their most flattering prospects.

CREW, MOORE & LEVICK, Oil Merchants, 113 Arch street, Philadelphia.—Early in 1861, J. Lewis Crew, a member of the firm of Crew Brothers & Co., manufacturing chemists, whose laboratory was at that time located at the corner of Sixth and Oxford streets, commenced making experiments, on his own account, to ascertain the most economical, expeditious and perfect mode of refining the crude petroleum, which had then recently been discovered in the western counties of Pennsylvania. Having succeeded in his experiments, he associated with his brother, under the firm-name of B. J. & J. L. Crew, and in 1862 removed to the vicinity of Arch and Twenty-third streets, where they established an oil refinery. This undertaking proved successful, and they continued to operate the refinery until May, 1864, when the works were destroyed by fire. They now sought for a more favorable location for extending their operations, and with additional capital, furnished by Joseph Newhouse, who became associated with them, erected the Belmont Oil Works, on the line of the Philadelphia & Reading Railroad, the buildings being put up in the most substantial manner, and the most approved machinery being introduced. The capacity of the works was 1500 barrels per week; there were ten stills in operation, of various sizes, from 25 to 100 barrels each. The article manufactured was of but one quality, which was so superior that it received at the Paris Exposition, 1867, the medal of merit; and on account of its excellence it always commanded a higher price in the market than that produced by any other refinery. The Belmont Oil Works had been in operation about four years when the site was absorbed by Fairmount Park. Pending the negotiations for purchase, the works ran for a short time as a manufactory of gasoline. The firm was dissolved, and in the same year J. Lewis Crew, one of the partners, commenced the mercantile business in Margaretta street, where he remained until June, 1870; and after associating himself with Lewis J. Levick, constituting the firm of J. L. Crew & Co., removed to a warehouse on Water street. Here they continued but a short time, as their business had so augmented that they required larger space. This they found at No. 130 South Second street, where they removed in December, 1870, at the same time admitting John W. Moore, forming the present firm of Crew, Moore & Levick. For two years they successfully prosecuted their business at this stand, which in its turn, and like their previous locations, proved inadequate for their purposes. In January, 1873, they purchased the property No. 113 Arch street, removed there, and still continue to occupy the same. They attribute their success to their rigid adherence to legitimate trade, avoiding all speculations.

J. LEWIS CREW was born, February 28th, 1830, in Richmond, Virginia. He was educated at West Town boarding school, Pennsylvania, and in Professor Gummere's Academy, at Burlington, New Jersey. When seventeen years old he entered the drug store of his brother, James H. Crew, as an apprentice to learn the business, and continued with him until August, 1848, when his brother was obliged, through sickness, to relinquish the business. He conducted it alone for a short time, and in January, 1849, associated himself with another of his brothers, under the firm-name of B. J. & J. L. Crew, continuing the same at the old stand, at the corner of Callowhill and Fifth streets. In 1851, he was himself afflicted with a pulmonary disease, and, following the advice of his physician, spent eight months in the West India Islands. On his return home he disposed of his interest in the drug business to his brother, and in December, 1852, commenced again on his own account at the corner of Frankford road and Phœnix street, in the old district of

Kensington. Here he remained until 1859, when he again associated with his brother, B. J. Crew, first in the building of a factory on Cadwallader street, and finally as his partner in the laboratory at Sixth and Oxford streets, having purchased the interest of his brother's partner in the latter establishment. His life, so far well spent, has been that of an earnest, hard-working, persevering and ingenious citizen. He attributes his success in life to the following out of the principles taught him by his mother, who was a woman of remarkable piety.

DUNCANNON IRON COMPANY. President, William Wister; Secretary, William E. S. Baker; Treasurer, John Wister, Jr. These works are located at the village of Duncannon, Perry county, Pennsylvania, near the junction of the Juniata river with the Susquehanna, and on the line of the Pennsylvania Railroad. At a very early day in the history of iron manufacture in this State there was a forge in operation here, but it was of a primitive character, and its proprietors—Duncan & Mahon—were unfortunately dispossessed of their forge by the sheriff's writ of execution. This was prior to 1836, and Frederick Watts of Carlisle was the purchaser; he soon grew tired of his investment, and disposed of his entire interest to William Logan Fisher of Philadelphia, and Charles W. Morgan of New Bedford, Massachusetts, associated together under the firm-name of Fisher & Morgan. The property originally contained 7000 acres of land, supposed to be rich in iron ore and coal. At various dates this land has been disposed of, until at present only about 1000 acres remain. The forge, as at first operated by Fisher & Morgan, consisted of four forge fires and one chafery; the product was large blooms for boiler plate and bar iron. From the very beginning the proprietors continued to enlarge and extend. The first work before them was the rebuilding of the dam on Sherman's creek, and the improvement of the forge; new water-wheels were also erected. This was in 1837, and while the whole country was prostrated by the financial panic. The firm of Fisher & Morgan, however, were not embarrassed by the ruin around them, and as soon as prudence permitted continued to pursue the course they had mapped out. In 1838, the boiler-plate mill was built, but was never successful, as the plate made was of an inferior quality and orders were scarce. The boiler-plate trade failing, the mill was used for rolling nail plate, in the same manner now customary in all plate mills. Before this time long plates were rolled similar to what is known as band-iron, and the nails were cut across the grain, so that the best quality of iron was necessarily required. It is worthy of note that the present mode of rolling plates was first introduced at Duncannon, though little or no success attended the effort, and it was soon abandoned. The plate thus rolled was carried to New Cumberland, where it was made into nails. In 1839, the merchant mill was erected, and is substantially the same mill at the present time. In the autumn of 1874, the upper layer of timbers in the foundation were removed, but the bottom was found in a good state of preservation. As soon as the bar or merchant mill was in running order, the old plan of rolling nail-plate was resumed, and Duncannon lost its claim to precedence in the new process. Bar iron was also added to the product of the works, and, as the new mill was one of the best in the State, the firm gained a profitable trade. The nail factory was built in 1840, and originally contained but twenty machines; now it has increased to fifty-four, with the capacity of producing 2500 kegs per week. The blast furnace was erected in 1853, by Fisher, Morgan & Co., and when built was one of the largest on the Susquehanna. The stack is 39 feet high, and diameter of the bosh 14 feet. The blowing engine is horizontal, driving an upright blowing tub. The hot ovens are after the Player pattern. The average annual capacity is stated as 7000 tons per annum; during the year 1872, the product was 7109 tons. The ores reduced are the fossil and Cornwall magnetic. The company are the owners of extensive ore lands and mines, which are located at convenient distances from the furnace. The rolling mill includes the puddling and finishing departments. The former contains sixteen furnaces, built after improved patterns covered by letters patent. Over eight of these furnaces boilers are placed, which supply the steam to drive the 100 horse-power engine, which works the mill, the shears, and coffee-mill squeezer. The puddling department produces from 160 to 190 tons per week, when in full operation, supplying the two merchant mills and nail-sheet mill with puddle bars. The quality of the nails and bars depends upon the character of the pig-iron used, and also upon the workmanship, but especially upon the puddling or converting process. This is the foundation of all the finished work, and therefore the greatest vigilance is directed to this important feature. The best raw material is used. None but the best puddlers or boilers are employed; the celebrated Lake Champlain black oxide is used for lining the furnaces, and the proprietors have con-

stantly in view the manufacture of the best puddle bar, as upon this basis rests the high reputation which their bars and nails have secured. The merchant mill department contains three furnaces, over each of which two boilers are placed to supply steam. Two furnaces heat for the 16-inch train, which is driven by an upright engine built by I. P. Morris & Co. of Philadelphia. One furnace supplies the 8-inch train. The 16-inch train rolls all sizes from six inches to one; the 8-inch train all sizes. The nail-plate train is under the same roof as the merchant mill, and is operated by the same engine: it supplies the nail factory with plate. In connection with the works is a foundry, in which all castings are made, thus economizing time and material. It should be stated that the firm of Fisher, Morgan & Co. were the first to use anthracite pig-iron, which was supplied to them by Samuel Wood of Avaring Creek Furnace. As an interesting matter of history in connection with the war for the preservation of the Union, it may be mentioned that 100 of the employés of these works joined the celebrated "Bucktail Regiment," and the iron men acquitted themselves nobly in camp, field, and battle. John Wister, Jr., the Treasurer of the company, is also the General Manager. All the stock of the corporation is in the hands of the heirs of the original owners.

WILLIAM LOGAN FISHER, the senior partner of the firm of Fisher, Morgan & Co., was born, 1781, in Philadelphia, and received his early education in that city. At the age of fourteen he removed to New Bedford, Massachusetts, where he was apprenticed to William Rotch, Jr., a shipping merchant of that flourishing town; and after serving the time for which he was indentured, entered into business there on his own account, and did not finally leave New Bedford until 1809, when he returned to Philadelphia to engage in the manufacture of woollen goods and the printing of calicoes. To these two branches of industry he devoted himself for several years—the former at Germantown and the latter at Frankford. Although he was actively engaged in business affairs from early life until his death, he nevertheless found time for literary labors, and wrote several books and pamphlets, the most important being the "History of the Sabbath," which gave rise to a considerable discussion in the newspapers and periodicals of the day, as it was decidedly hostile to Sabbatarianism, then far more prevalent than at present. He died in 1862.

CHARLES W. MORGAN was also a native of Philadelphia, and, like his partner, removed to New Bedford in early life. He never took an active part in the Duncannon Iron Works, having large business interests in New Bedford, where he had fixed his residence. He was a man of high character and business standing, and is remembered with affection by those of the employés of the works under the old organization.

WILLIAM WISTER, President of the Duncannon Iron Company, was born, February 4th, 1804, in Philadelphia. He is the son of John Wister, a prominent merchant and importer of that city, and a grandson of John Wister, who emigrated from Heidelberg early in the eighteenth century. On his mother's side he is a great-grandson of Owen Jones, the first Treasurer of the Commonwealth of Pennsylvania. He was educated in the public schools of Germantown, and when he had arrived at man's estate became engaged in the manufacture of woollen goods, near Germantown, in connection with his brother-in-law, Thomas R. Fisher, the firm being known as Wister & Fisher. He continued in this business for several years, when he disposed of his interest in the same, and subsequently purchased a calico print works near Germantown, and remained for a number of years its proprietor. In 1853, he was elected Treasurer of the North Pennsylvania Railroad Company, and this position he has ever since retained. He is largely interested in iron manufactures, being a stockholder in several companies. He is a Director of the Hand-in-Hand Insurance Company, and also of the Philadelphia Saving Fund Society. During the War of the Rebellion, though too old to enter the service, he gave his six sons to the Union cause, and these were all in the field at the same time. He also contributed liberally to the Sanitary and Christian Commissions, and to the support of the National Government.

SHOENBERGER & CO., Proprietors of Juniata Iron Works. SHOENBERGER, BLAIR & CO., Proprietors of Blast Furnaces, Pittsburgh. These two firms, although to some extent united, own different properties, and control separate investments, capital stocks, etc. The present partners embrace the following gentlemen: W. H. Shoenberger, S. S. Blair, Charles L. Fitzhugh, John Z. Speer, Peter Shoenberger, and G. A. Steiner. John H. and George R. Shoenberger are special partners in the firms, who, after retiring as active

partners some years previously, returned to the firm in 1873. The business was founded at an early day by Dr. Peter Shoenberger, father of the present senior partners, who had emigrated to this country from Germany when quite young. He erected several furnaces, which he called after the names of his daughters: the "Sarah Furnace," the "Martha Furnace," the "Maria Forge," etc. In 1828, he built the "Rebecca Furnace," in Blair county, and in Cambria county he owned the "Ben's Creek," the "Mill Creek," the "Black Lick," and the "Cambria" furnaces. He was a shrewd, observing man, and remarkably successful in obtaining good locations for his furnaces. He was also the proprietor of the Juniata Forge, in Hunterdon county; all these furnaces and forges being in Pennsylvania. He erected the first rolling mill—the Juniata Works—which was put in operation in Pittsburgh, in 1824, over a half century ago. These are the works at present controlled by the firm of Shoenberger & Co. They are located near the Allegheny river, between Fourteenth and Sixteenth streets, and cover about eleven acres of ground. In these works are manufactured sheet and plate iron, horse and mule shoes, horse-shoe shapes, etc. There is also a large nail and tack factory on the premises, containing ninety-two nail machines, with all the appliances necessary, including twenty-nine puddling furnaces, eleven heating furnaces, and seven trains of rolls. Cut nails and tacks of all descriptions are here manufactured. The firm who control the blast furnaces are the proprietors of large tracts of land containing iron ores, which are located partly in Canada and partly in western Pennsylvania, which they mine themselves, using the ores in their furnaces. They also own several important coal mines, and manufacture their own coke. These several products are moved to their works by rail. The capacity of the blast furnaces is estimated at 25,000 tons of pig metal per annum, and during the same period they can puddle 17,000 tons. The firms employ from 800 to 1000 men at their mines and in the furnaces, rolling mill, and nail factories.

JOHN H. SHOENBERGER was born, 1810, at Juniata Forge, Huntingdon county, Pennsylvania, and received a first-class education, closing the same at Jefferson College. In 1833, he went to Pittsburgh, where he entered into business, and was a partner with his father. He also purchased works in Huntingdon county, and remained in business until 1862. In 1871, he was elected President of the National Exchange Bank of Pittsburgh, which position he still retains.

SOUTH SIDE BRASS FOUNDRY AND MACHINE SHOP, Pittsburgh, John Fitzsimmons, Proprietor. This business was started, in October, 1872, by the present proprietor, who has overcome the many obstacles incident to a new enterprise, and has firmly established a business which is constantly increasing and has eventually proved remunerative. The buildings are located on the northwest corner of Carson and First streets, covering an area of ground 40 feet by 100. On the first floor are the engine room and foundry; the upper floor contains the machine shop and finishing rooms. In the foundry are two large furnaces for the melting of brass, each of the capacity of 800 pounds; their diameters being 27 inches. They are the largest brass furnaces west of the mountains. A large crane is used for the purpose of removing the crucibles. There are also two smaller furnaces, with a capacity of 200 pounds each. The chief articles manufactured are brass castings and anti-friction metals. The capacity of the works is about 600 pounds of light castings per day. During 1874, the house turned out the largest brass castings ever made in Pittsburgh. These were for the new Water Works, and consisted of forty "valves," each weighing 465 pounds; forty "seats," each of 378 pounds: the entire weight of castings for the Water Works being 35,000 pounds. With the improved machinery with which the foundry is furnished, single castings of 1500 pounds weight can be furnished. The trade is chiefly a local one, and there is a constant demand for goods from iron and glass houses. In addition to the foundry, repairs of all kinds are attended to in the repair shop connected with the works.

BLACK LEAD CRUCIBLE WORKS, McCullough, Dalzell & Co., Proprietors, Pittsburgh. This is the only establishment of the kind west of the mountains in successful operation. It was established, in 1872, by M. McCullough, Jr., J. H. Dalzell, C. C. Arensberg, and H. E. Dubarry, who constitute the above-named firm. Their works are located on Thirty-sixth street below the railroad, in the Fifteenth Ward of the city of Pittsburgh, and occupy a space of over one and a half acres of ground. The manufactory is doing, no doubt, the largest trade in the line in the State. The crucibles made by the firm bear a higher heat than those of any other establishment, as well as sudden changes of temperature, have a smooth surface, and are

therefore preferred by the melters of brass and steel. They have an excellent reputation, and are favorably known in every section of the country. The firm attribute their success to the fact, that they aim to make only a first-class article, and never allow anything imperfect or inferior to leave their factory. They supply the larger establishments with their crucibles, and the high standing already attained by the firm is an evidence of their determination to excel in the production of their goods.

PHILADELPHIA & READING RAILROAD COMPANY'S ROLLING MILL is one of the numerous enterprises undertaken by the great corporation which is its proprietor, and is located at Reading, Berks county. It was designed for the manufacture of railroad iron, but upon being enlarged and otherwise improved, it commenced rolling steel rails in February, 1873. The steel is furnished to the company by the Midvale Steel Works, Nicetown, Philadelphia, and is made by the "Siemens-Martin process." The average annual capacity of the rolling mill is stated as 29,000 tons of steel rails. A very large force of employés are constantly engaged, and the pay roll reaches a very considerable sum.

FREEPORT DISTILLERY, A. Guckenheimer & Co., Proprietors, Armstrong county. This firm, under this style, has been engaged in the liquor business since 1857. In 1865, the following gentlemen became partners in addition to the senior member: Samuel, Emanuel, and Isaac Wertheimer, who have continued as the "company" to the present time. When this partnership was formed they purchased the distillery of Thomas Bell & Co., who had erected and operated it for some fifteen years, and which is located in the borough of Freeport, on the banks of the Allegheny river, about thirty miles above Pittsburgh. There are about four acres of ground belonging to the property, on which are erected, in addition to the distillery, stables, offices, and all necessary outbuildings. The main building covers about 180 by 35 feet, is built of brick, two stories high, with a commodious garret, a capacious cellar—the latter containing the fermenting tubs—and below this the sub-cellar with the "beer sink," or cistern to receive the mash. The West Pennsylvania Railroad passes directly in front of this building, and contributes to the convenience of delivering grain and shipping of the goods. The grain used in this distillery is exclusively the best rye. It is ground by two burrs, sifted carefully of the dirt and chaff, and then the meal is thrown into a large hopper, and thence dropped into a mash tub 17½ inches in diameter, of 8000 gallons capacity, made of the best wood. Hot water flows from a hot water tank into this tub at the same time that the meal is dropped from above, and this scalding of the meal constitutes what is called "sweet mash." At the same time, also, the mash is agitated by a triple rake, revolving in the tub by steam power, and thus the process of "cooking" continues until the standard degree of temperature of this distillery is attained. At this point a cooling down of some 20 degrees is necessary, which is done by means of a flow of cold water, turned on from a cold-water tank through two lines of tubes of two and a half inches each, running around the inside of this mash tub, about eighteen inches apart and one foot from the bottom: a fan is also used for this purpose. The malt is then added, which is solely of barley—as this grain contains much saccharine matter—and the cooking continues until sufficient sweetness is acquired—found by the test of the saccharometer. The mash is then again cooled to a certain degree, and from here it is run off through a sluice into twelve fermenting tubs, averaging 6000 cubic gallons each, and then the yeast is added. There are two yeast tubs, copper lined, with valves on the side for flow of water between. A hop boiler is connected with these tubs, though but little hops are used, that the whiskey may be free from bitterness. From the fermenting tubs the mash is conveyed by sluices to a great beer sink under ground, and afterwards raised from this sink by the usual beer pump to a three-chambered "beer still," in which there are three standing pipes running through each chamber. From this still the swill is passed off, through a large tube, to the stock yard, while the hot vapor rises through the standing pipes to the "worm tub," and is condensed by the cold water. The worm in this tub has the extraordinary length of 800 feet, and is six inches in diameter; for it must be remembered that condensation is a great point in distillation, and the longer the worm the better the result. The spirit here produced passes through copper tubes to the "copper doubling column still," 22 feet high, which has a globe or refiner attached at the top of the column. From this still all the produce runs into a "separator," and all proof (100 degrees), or above, which is called "high wines," passes over to the receiving

tanks; while all under proof, termed "low wines," is of course too weak to escape, and is run back and mingled with the next yield to be distilled over. Three receiving tanks, holding 35 barrels each, contain the whiskey as produced, until drawn off and barrelled by the inspector. The water of the Allegheny river possesses properties peculiar to good distillation, and is used exclusively by this distillery during the winter, and is drawn up through iron pipes. During the summer months water is used from a fine well of like beneficial properties, and thus an even temperature in cold water for cooling and condensation is kept up. This is as requisite as the even temperature of hot water to the good, steady quality of a brand. When the distillery was first purchased the capacity was 200 bushels per day; it is now 700 bushels, or 64 barrels every twenty-four hours. There is an engine of 72 horse power, with 3 boilers, in first-rate working order. The malt house, measuring 40 by 90 feet, is separated a short distance from the main building. It is of brick, two stories high, with a basement, containing a grain room, a growing or sprouting cellar, and a fine kiln for drying. As above stated, barley is exclusively used. The bonded warehouse is iron-clad, and is 54 by 380 feet in dimensions, two stories high, and of the capacity of 12,000 barrels. The barrels of this distillery are heavily charred and iron-bound. There is perhaps no brand of whiskey in the market that has so rapidly acquired a distinction, and so great a demand from different sections of the country, as has the produce of this distillery during the past five years. Although when the premises were purchased it then bore a good name, it has by the present firm been so operated as to yield the very finest quality of a pure rye article; and by close attention to their process of distillation throughout, from the selection of the grain to the spirit when made, they have attained their present widespread reputation. The Freeport whiskey acquires much body and flavor by age. It is a straight rye whiskey, and is considered so good an article by the trade that large quantities are used throughout the country in the improvement and grading of other whiskeys. In the firm, A. Guckenheimer attends to the financial department; Samuel Wertheimer has charge of the sales; Emanuel Wertheimer is the manufacturer and outside business agent; and Isaac Wertheimer is charged with the books. The firm have in their employ the services of Patrick O'Brien as distiller, who is in every way qualified for the important duties intrusted to him. The warehouse of the firm is at Nos. 93 and 95 First avenue—a three story building measuring 40 by 90 feet.

EMANUEL WERTHEIMER is of German birth and education. He came to the United States in 1852, and settled in Pittsburgh, where he engaged in the stock business with his brothers. In 1857, his brothers Samuel and Isaac Wertheimer took charge of the liquor business, under the present firm-name, while A. Guckenheimer and himself continued in the droving business until they engaged in the distillery in 1865. He is a Director of the Freeport Savings Bank, of which the firm is a large stockholder, and were its originators.

JACKSON & WOODIN MANUFACTURING COMPANY, Berwick, Columbia county; capital $200,000. This company includes various industries in its several departments. The works comprise a foundry, machine shops, smith shops, erecting shop, and saw mills. Their business includes the manufacture of cars and car wheels. The foundry measures 85 by 28 feet, and contains six cupola furnaces. The wheel capacity of this foundry is 200 wheels per day, or 60,000 per annum. The saw mills are located in Columbia and Luzerne counties, and have a product of 1,650,000 feet of lumber. The number of cars built in the shops averages 6300 per annum; of these 2100 are eight-wheeled and 4200 four-wheeled freight cars. The company employ 450 hands in the several departments, and the estimated value of all articles manufactured exceeds $1,000,000 yearly.

BRADY'S BEND IRON COMPANY. Capital $1,000,000. This company are the owners of a very extensive industrial establishment located at Brady's Bend, Armstrong county, and consisting of furnaces, foundry, iron works, etc. There are four furnaces, the stacks of which are 44 and 50 feet high, and the diameter of the boshes are 9, 10, 13, and 14 feet. The ores used are the Lake Superior and the carbonaceous; the latter is mined by the company on lands which they own, and the amount annually produced is 30,000 tons of ore. The average annual yield or capacity of the four furnaces is stated to be 32,000 tons of pig metal. In 1872, there were produced 11,931 tons; but it should be remarked that all the furnaces were not in blast during that year. In the foundry castings for heavy machinery are made to a very considerable extent, while in the rolling mill 20,000 tons of

rails and bar iron are manufactured annually. The company also make a superior article of fire-brick. Between 600 and 700 hands are employed in the several departments. The stock of the company is principally owned in New York.

BRYCE, WALKER & CO., Manufacturers of Glassware, Pittsburgh. This house was first organized in 1850, by Bryce, McKee & Co.; they were succeeded, in 1855, by Bryce, Richards & Co.; and in 1865 the present firm was constituted. The business which occupies their attention is the manufacture of table, lamp and perfumery, crystal and pearl glassware, these being their specialties and comprising almost an indefinite number and style of goods. The manufacturing department is situated in what was formerly known as East Birmingham, now Pittsburgh, South Side. The premises occupy a tract of ground 240 by 300 feet; and the works are of the largest size. The capacity of the crucibles is 3000 pounds; and three large glass furnaces, six tempering ovens, etc., are in constant use. The consumption of soda each day is two casks. This is melted by steam, Bryce, Walker & Co.'s being the only factory that resorts to this process. The cleaning, moulding, refining, pattern and packing departments are ably taken care of and reflect great credit upon those who superintend them. All packing is done with prairie hay, which is much safer than by any other mode, the breakage of wares occurring very seldom. The office and warehouse is located at No. 95 Water street and No. 122 First avenue; the former is three stories high, 30 feet front and 160 feet deep, and is devoted exclusively to the storage of the productions of the factory. This house received, in 1856, the highest honors at the Franklin Institute Fair, where there were many competitors in their special line; and in the same year the silver medal was awarded them at the Pittsburgh State Fair.

PORTER, BELL & CO., Manufacturers of Light Locomotives: Office, No. 5 Monongahela House, Pittsburgh. This highly important addition to the manufactures of Pittsburgh grew out of a business established in 1867, by Smith & Porter, on premises located on the south side of the Monongahela river. After having been in successful operation for about four years, the works were unfortunately completely destroyed by fire. Being resolved, however, not to allow a valuable manufacturing interest to lie dormant, a new co-partnership was entered into, under the style of Porter, Bell & Co., who erected extensive workshops on the Allegheny Valley Railroad, at the corner of Fiftieth street, Pittsburgh, with every appliance necessary to the production of their engines. The works embrace the following buildings: the main shop, measuring 62 by 102 feet, two stories high; the carpenter shop—a light, cheerful building—41 by 73 feet; the erecting shop, 40 by 102 feet; the blacksmith and boiler shop, 42 by 82 feet; and an iron and brass foundry, 53 by 73 feet. The idea of the firm has been to centralize, as much as possible, the various processes for producing a finished locomotive; by which means every detail, from the boiler to the cylinders and from the pumps to the whistle—the mouthpiece of the engine—is subjected to their entire supervision. Among the specialties which the firm claim is the manufacture of light locomotives for narrow gauges; and, unlike other builders, who alter the patterns of large engines and make compromises at the sacrifice of scientific construction, they make special designs of all the types of engines built by them, with the necessary patterns, etc. It will thus be seen that, by confining themselves strictly to one branch of the business, they are in a position to supply an engine expressly adapted, in every particular, to the work it has to perform, and this without compromising the beauty of design or proper disposition of details, which must necessarily occur when patterns are altered or made to suit, which do not properly belong to the particular work. Thus it is that, untrammelled by expediency, they have been able to give full scope to their ingenuity and completeness of construction. The success to which the firm has attained is due to their experience as to the requirements of a locomotive. They build engines from five to twenty-five tons weight, comprising various styles for special purposes: *e. g.*, a light style locomotive for special service, for work on short roads at coal and other mines, blast furnaces, iron mills, lumber mills, quarries, etc. And of this description there are several sizes, with four or six drivers, saddle-tank or separate tender, with cylinders from 7 inches in diameter and 12 inches stroke to those of 9 inches in diameter and 16 inches stroke, and for gauges of 2 feet and upwards. Another variety is their "Heavier style special service locomotive," for working generally on a 4 feet 8½ inches gauge (the American standard gauge), with cylinders ranging from 9 to 14 inches

diameter and 16 to 20 inches stroke. These are excellent railroad yard shifters, pushing heavier loads than the engines generally used for this service. For passenger service on narrow gauge roads, they make a very handsome engine, with 10-inch cylinders and a 16-inch stroke, the drivers of 44 inches diameter and a two-wheel swing truck. These engines make a schedule time of twenty miles per hour on the Cairo & St. Louis Railroad, over a maximum grade of 94 feet per mile, with a train of four cars. In the month of March, 1874, one of these engines ran 4100 miles. Their lighter passenger engines, with an 8-inch cylinder, 16-inch stroke and 36-inch drivers, are used on shorter roads, among which are the Peach Bottom Railroad, the Memphis & Raleigh Railroad, the Toledo & Maumee Railroad and the Martha's Vineyard Railroad, the only road on the island of that name. Another style of engine built by the firm is much sought after—their narrow-gauge freight locomotives. The Bingham Canyon Railroad, Utah, uses engines with a 12-inch cylinder, a 16-inch stroke and six drivers, 33 inches in diameter, together with an eight-wheel tender. These regularly haul eight loaded cars, whose total weight equals 83 tons, up a maximum grade of 172 feet per mile, and have even hauled over 100 tons. The Colorado Central Railroad is built up a winding canyon at a cost of $20,000 per mile, where a wide gauge road would have cost $90,000 per mile. Their locomotives with a 12-inch cylinder and 16-inch stroke haul up six loaded cars, or nearly seventy tons, over this road with its excessive curves, and grades of 190 feet per mile, and have nearly started the curves, rendering it inadvisable to attach a longer train. Among the other successes of steam over manual or horse power is the introduction of locomotives for mining purposes. There were many difficulties encountered in perfecting these engines: the miners' prejudices, the anticipation of smoke, the limited head room and side room of mine entries, the irregular curves of short radius, the heavy grades and the light rails. The Consolidation Coal Company, of Maryland, operate two sizes of their mine engines. The first variety regularly hauls six loaded mine cars—a total load of about seventeen tons—up a grade of 185 feet per mile; and the second hauls forty empty mine cars up a maximum grade of 115 feet per mile, two and a-half miles underground. Of these engines James A. Mulholland, resident agent of the company, says: "The 'Mole' now lives entirely underground, hardly ever coming to the surface. We have so arranged the ventilation of our mines that the little locomotives are no more objectionable to the miners than horses." Among the many instances of the successful working of these locomotives may be mentioned those used by the George's Creek Coal and Iron Company, Jones and Laughlins, Pittsburgh, the Westmoreland Coal Company, the Lehigh Coal and Navigation Company, the Susquehanna Coal Company, the Union Coal and Mining Company, and the Carbon Coal Company in Iowa. Beside coal works, there are other large establishments where mine locomotives are used. F. Shanky & Co., who are engaged in the celebrated Hoosac Tunnel, Massachusetts, thus express their opinion of one of Porter, Bell & Co.'s engines, used by them and kept in steam night and day, with but little cessation, since 1869: "There never was, we believe, a locomotive engine that has done more rough work, with fewer repairs, than the 'Gov. Claflin;'" and in a recent letter added: "The locomotive has nearly done 'our,' not 'her,' work; she has plenty of life in her yet." These engines are also used in the construction of the Sutro Tunnel, Nevada. These mining engines enjoy an extensive reputation, and are at work not only throughout the United States, from the Eastern and Southern coasts to Washington Territory, but also in the Canadas, Cuba, Ecuador and other South American republics. The firm is noted for strict attention to business, which a skilful division of the duties devolving on each member enables them to bestow. While this continues, there is no reason to doubt that in the course of a few years the firm will greatly enhance the reputation they have already acquired as representative manufacturers. Two hundred hands are constantly engaged at their works, and they have the capacity of producing sixty locomotives per annum. The amount of capital invested is not less than $150,000.

HARRISON BROTHERS & CO., Manufacturing Chemists, Philadelphia. The present firm consists of the sons and grandsons of the founder of the house, John Harrison. The latter studied the science of chemistry under the celebrated Dr. Priestley, and was firmly impressed with the belief that many articles which had been imported into the United States could be produced in this country, thereby rendering its citizens not only independent of a foreign market, but also opening up new industries in the youthful Republic. As early as 1793, he had manufactured sulphuric acid with marked success at his establishment, on Green street west of Third, and to this he added

other products from year to year. Up to 1804 he seems, however, to have confined himself exclusively to filling orders as required by his patrons, manufacturing on a small but remunerative scale. In a letter addressed by him to President Jefferson (1804), he intimates that he had recently extended his line of manufactures by adding to the products of his laboratory the various preparations of mercury, antimony, copper, etc., used in the arts and in medicine. The amount of capital invested at the start was $5000; at this period, however, he states that he had placed $40,000 in the concern. His leaden chamber, for the production of sulphuric acid, was but a small one, only capable of making 45,000 pounds of the article per annum. In 1807, he had built a larger leaden chamber, 50 feet long, 18 feet wide and 18 feet high, capable of manufacturing nearly a half million pounds of sulphuric acid yearly, the price of the article then being about fifteen cents per pound. The article, as concentrated in leaden chambers, is not of the strength required in commerce, and the only means then known to thoroughly reduce it to the requisite density and strength was by boiling it in large glass retorts. This, however, was a very precarious undertaking, as the loss occasioned by the incessant breakage of glass and spilling of the acid largely increased the cost of manufacture. About this period there resided in Philadelphia a savant, Dr. Erick Bollman, a Dane by birth, who had brought from France the method, then lately discovered by Dr. Wollaston, for converting the crude grains of platinum into bars and sheets. One of the first uses to which he applied the sheets was the making of a platinum still, for John Harrison, to be used by him for the concentration of his sulphuric acid; it weighed 700 ounces, would contain twenty-five gallons, and was used continually for fifteen years. This early application of platinum for this purpose is highly creditable to the sagacity and ingenuity of the American manufacturer; for this use to which the rare metal was put was even then a novelty in Europe, and had been known but a very few months, and only to a few persons. To the products already named was added, shortly afterwards, the manufacture of white lead; and to this succeeded the construction of an apparatus to produce pyroligneous or acetic acid, on an extended scale. Subsequently, there were gradually added the preparation of colors: red lead, litharge, brown and white acetate of lead; alum, copperas, acetate of lime and other chemicals. The Green street laboratory had long appeared to be too circumscribed for such heavy operations, and an eligible location was secured in the then district of Kensington—now the Eighteenth Ward of the city of Philadelphia—where extensive buildings were erected and large manufacturing facilities afforded. Even these in after years proved inadequate to meet the demands of the firm, and the proprietors established a large manufactory in the southwestern part of the city, near Gray's Ferry, with which their works in Kensington and offices in Philadelphia and New York city are connected by telegraph wires. The firm now prepare, in addition to the products already named, chemicals for paper-stainers, fine colors in pulp, dry and in oil, and the various acids used in the arts. Their white lead works, at Gray's Ferry, when completed, will have the capacity of producing over 4000 tons of this pigment yearly, which, it is believed, largely exceeds the abilities of any similar establishment in this country. In this branch the house was also among the pioneers, having successfully corroded in 1806, being second only to the Messrs. Wetherill, who took the initiative in this industry. Besides these works already named, the firm are largely interested in factories in Maryland and New York, the products of which they dispose of, or use entirely in their Philadelphia laboratories. Their Gray's Ferry works, large as they now are, constitute but the nucleus of a comprehensive plan which will eventually be developed into a mammoth establishment for the production of chemicals and paints, and will contribute largely to make Philadelphia as renowned for its manufactures in this particular as it is for so many others.

OLIVER EVANS, Blacksmith, was a descendant of Dr. Evan Evans, the first Episcopal minister of Philadelphia, who died in 1728. He was born in that city in the year 1755. Much of our steam invention is chiefly due to him. He understood the application of it to wagons, and in 1787 the Maryland Legislature granted him its exclusive use for fourteen years. Even prior to the Revolutionary War he had thought of and experimented on the expansive power of steam, but nobody believed him, and many deemed him insane. Among some of his published writings may be quoted the following:

"The time will come when people will travel in stages, moved by steam engines, at fifteen miles an hour!

"A carriage will leave Washington in the morning, breakfast at Baltimore and sup at New York *on the same day!*

"*Railways* will be laid, of wood or iron, or on smooth paths of broken stone or gravel, to travel as well by night as by day.

"Engines will drive boats ten or twelve miles an hour; and hundreds of boats will run upon the *Mississippi* and other waters, *as prophesied thirty years ago*," etc., etc.

Finally, he published his bet of three thousand dollars, engaging "to make a carriage to run upon a level road against the swiftest horse to be found." His iron foundry, steam factory and mill were located at Philadelphia. He died at New York, April 15th, 1819. He published the "Miller's and Millwright's Guide," 1795; the "Young Engineer's Guide," 1805. The former work was patronized by Washington, Jefferson and others.

PITTSBURGH LIGHTNING ROD WORKS, Lockhart & Co., Proprietors. These works were established, in 1855, by T. J. & L. J. Lockhart, who had purchased the right to manufacture "Munson's Patent Lightning Rods" in the States east of Indiana. The business is carried on by the present firm at No. 234 Penn avenue, Pittsburgh. The principal feature peculiar to this rod is its great amount of conducting surface as compared with its weight, besides the superior conducting quality of the metal used, which is copper. The very best article of copper attainable—being that from the celebrated works of C. G. Hussey & Co.—is employed in the construction of the rod, which is formed from the sheet, cut into long narrow strips, the upper sections being 10 feet long and the lower 8; these, after being fastened, are twisted together in a spiral shape, thus forming, as it were, a tube and giving a great amount of conducting surface. The rod is not limited to a particular size, but can be and is made of any required dimensions. The trade of this house extends from Maine to Georgia, and several millions feet are made yearly.

KEYSTONE STEAM PUMP WORKS, Epping, Carpenter & Waring, Proprietors, Pittsburgh. This business was established, in 1866, by the firm of Potmeyer & Winter, for the manufacture of direct acting pumps, on the premises located at the corner of Penn and Thirty-second streets, Pittsburgh. In 1868, the firm was changed by the withdrawal of the senior partner and the admission of Henry Epping, under the firm-name of Winter & Epping, who continued the works until 1872, when the present proprietors, Henry Epping, W. H. Carpenter and E. J. Waring succeeded to the business. At this latter date, the style of pumps was changed from direct acting to a form which employed a fly-wheel, being the invention of Henry Epping, and for which he received a patent. This new variety of pump has given great satisfaction, and notwithstanding the capacity of the works was doubled in 1872, the demand for it has always been greater than the supply.

HENRY EPPING was born in Prussia, but came to the United States when very young, and learned the business of a glass-blower. He is a most excellent mechanic and has charge of the designing department of the works.

W. H. CARPENTER was born, 1846, in Allegheny City, Pennsylvania. He was two years employed as clerk and cashier with Hostetter & Smith; and for seven years was Assistant Cashier of the Pennsylvania Railroad Company. He attends to the financial part of the business of the firm.

PITTSBURGH BRITANNIA, BRASS AND TIN WORKS, Collins & Wright, Proprietors. This business dates from 1834, when it was established by Orrin Newton, and by him conducted alone until May 27th, 1863, when the present proprietors purchased the business, and have since continued it. When it first went into operation, there were but five hands employed. The originator of the enterprise was a man of much mechanical ingenuity and inventive genius; which, combined with great industry and strict integrity, caused the business to gradually increase until, when he closed his connection with it, he gave employment to twenty hands. His products were many useful and patented articles pertaining to the special line of business he followed. In 1863, the establishment located at the corner of First avenue and Cherry alley, Pittsburgh, passed into the hands of the present firm, composed of Benjamin F. Collins and Homer Wright, who, by a further exhibition of those qualities possessed by their predecessor, have increased the business threefold, now employing sixty-four hands, and have advanced largely the number and quality of the articles manufactured, which now consist especially of everything in the line of Britannia

ware, particularly in those articles and trimmings used by glass manufacturers. In October, 1867, a fire occurred, and the loss was $11,000; but being insured, they were enabled to continue the business, after a suspension of two months required to repair and rebuild the works, which were re-furnished with new and improved machinery; and other new arrangements facilitating work were made so as to accelerate the progress of development.

ROBERT FULTON, Civil and Mechanical Engineer, was born in Little Britain township, Lancaster county, Pennsylvania, in 1765. He was of Irish descent. Having received a common school education, he went to Philadelphia in 1782, and began life as an artist, repairing at the age of twenty to London, where he studied under Sir Benjamin West. Mechanics had special attraction for him, and while prosecuting his profession as a painter in Devonshire, he became acquainted with the Duke of Bridgewater, and also with Lord Stanhope, the latter of whom was an able mechanic. While in Birmingham he devised an improved mill for sawing marble; a machine for spinning flax and making rope; projected a plan for an improved inland navigation, with double inclined planes for the raising and lowering of canal boats; and in 1796 published a work on canals. In the following year he went to Paris, and for seven years studied physics, chemistry, and mathematics with Joel Barlow. In December, 1797, he made his first experiment in the Seine, for a submarine explosion. It was a failure, though his plan for a submarine boat was afterwards successful. In 1801, he made the acquaintance of Chancellor Livingston, of New York, who explained to him the importance, in America, of navigating boats by steam. Fulton had already been impressed with this idea, having some eight years previously addressed Lord Stanhope on the subject. He reapplied himself to the matter, and succeeded. He did not, however, claim the steamboat as his invention, but only the application of water wheels to move the vessel. In 1807, by the help of Livingston, he built the "Clermont," with which he navigated the Hudson at the rate of five miles per hour. In February, 1809, he patented his steamboat. In 1810, he published his "Torpedo War." In 1811, he constructed two steam ferryboats for crossing the Hudson river, and also projected an ingenious floating dock for their reception. In 1813, he obtained letters patent for a submarine battery. Next he conceived the idea of a steam man-of-war, and Congress passed a bill making a heavy appropriation for this object, which was built and launched. She was called "Fulton the First." He was employed in improving his submarine boat, when he suddenly died, February 14th, 1815.

IRON CITY WORKS, Mackintosh, Hemphill, Hart & Wade, Proprietors, Pittsburgh. The business was established, in 1859, by W. J. Mackintosh, J. Hemphill, and N. F. Hart, on premises at Twelfth and Pyke and at Pyke and Thirteenth streets, Pittsburgh. The capital was a limited one, and the number of hands at starting about twenty. The firm commenced the manufacture of steam engines, the specialty being engines adapted for blast furnace use. The ultimate success depended largely upon the mechanical skill of J. Hemphill, who effected such improvements in the construction of blast engines as to give the firm a monopoly in that description of work. In 1865, W. Wade, Jr., was admitted into the firm, since which date there has been no change. In 1868, J. Hemphill patented an improvement in balanced slide valves. Among the many contracts filled by this firm may be mentioned one for the Isabella Furnace Company of $75,000; one for the Glasgow and Port Washington Iron and Coal Company amounting to $150,000; one for the Lucy Furnace of $40,000; and one for the Edgar Thomson Bessemer Steel Works of $75,000. The premises now occupied by the firm cover a space of 100 by 250 feet, and give employment to 150 hands.

NEW CASTLE MANUFACTURING COMPANY. A. B. Berger, President; George L. Reis, Secretary and Treasurer. This is a joint stock company, and was organized in 1866, with a paid up capital of $50,000. It was established for the express purpose of manufacturing hot pressed nuts and wrought-iron washers exclusively; but has since been extended by the addition of a foundry and machine shops, and now constructs all descriptions of rolling mill and blast furnace machinery, from the largest blast engines to the smallest articles of iron used. The works consist of a machine shop measuring 176 feet by 60 feet in width; a foundry 120 feet long, also 60 feet wide; a blacksmith shop 48 by 32 feet; a pattern shop 50 by 30 feet; and a pattern house 60 by 30 feet, for the storage of patterns not in use. These several buildings contain a full line of the

most approved machinery and appliances, embracing six hot-pressed and three cold-pressed nut machines; three washer machines; six nut cleaners; six heating furnaces; four planers, one of which planes 8 feet square and 20 feet long; six lathes; two radial drills; one vertical drill; one 6-feet boring mill; one wheel press; two bolt cutters; one rotary blower, with large cranes and casting pits; two cupolas and one air furnace; making an establishment not surpassed by any in western Pennsylvania outside of Pittsburgh. The company give steady employment to about sixty hands, and pay out about $35,000 wages yearly. During the same period the works consume about 1000 tons of pig metal and 500 tons of merchant iron.

J. B. SHANNON, Locksmith, Bell Hanger, and Manufacturer of Builders' Hardware. The business was established by Hattrick & Shannon, changing subsequently to Littlefield & Shannon. In 1851, the senior partner withdrew, since which time the present proprietor has carried on the manufactory on his sole account. This is situated at No. 1009 Market street, Philadelphia, occupying the second and third stories of that building, the first floor being occupied by the salesroom. There are twenty-eight hands employed in the factory and twelve in the store, which latter includes, besides the articles manufactured, a full line of hardware, cutlery, etc. Among the specialties made at this establishment are locks, in which the proprietor has attained considerable distinction, producing largely for first-class dwellings and public institutions. He has constructed locks for a large number of insane asylums, where they are wanted in sets, to differ from each other, and yet to be passed by a master key by the superintendents, watchmen, and others. Similar locks are also applied to hotels and dwellings; and one member of a family may have a key which will open all the chambers and closets, and yet the respective keys of the doors will not open any except the one to which it belongs. He has also manufactured the locks used on the American line of steamships belonging to Philadelphia. Another specialty is in bell-hanging and the Electro-Magnetic Annunciator; the latter is so arranged that when the gong is sounded a small brass plate drops, revealing the number or name of the room from which the gong was sounded. Bells are also so arranged that a sick person may communicate the need of help to any other part of the house. Invalids can thus dispense with constant attendance. There are also made at this establishment hinges of all sizes and varieties, from the small, plain article to those of large dimensions and beautifully embossed; together with one specially designed for book-cases, where two doors are hung upon one hinge, thus dispensing with the necessity of a wooden strip as in other hinges. At the Fair of the Franklin Institute, held in 1874, the proprietor was the recipient of a bronze medal for the Electro-Magnetic Annunciator, and also of a silver medal for builders' hardware.

ALTERBURY & CO., Glass Manufacturers, Birmingham, Pittsburgh. This firm, composed of J. S. and S. B. Alterbury, established their works, in 1860, on the premises located at the corner of Tenth and Carson streets, Birmingham, for the purpose of manufacturing table glass-ware. They had about $15,000 capital when they commenced operations. At that time this particular branch of glass manufacture was in its infancy, and the firm introduced several new and valuable improvements in the making of glass-ware, as also new articles which had not heretofore been produced—such as ring jars—and these were manufactured by machinery, which reduced the price two-thirds. They also obtained several patents for designs of kerosene lamps; about thirty patents for these articles having been then granted and the lamps introduced. This was the only firm, at that time, that was enabled, through the machinery they had introduced, to produce sufficient quantities of lamps for exportation to Europe and South America. In 1870, they obtained a patent for a new jelly jar, of which they have manufactured eighty thousand packages. They have likewise invented a new method of attaching the parts of kerosene lamps by a screw socket, which obviates the inconvenience and expense of attachment by means of plaster of Paris. This particular variety of lamp has obtained an extended and favorable reputation. Among the articles of table glass-ware may be mentioned glass cups and fruit dishes, both with handles, which are all solidly cast by special moulds. Through the practical skill and innate ingenuity of the several members, the firm are enabled to introduce new and improved machinery in every branch of their business. The establishment covers an entire square, or block, and gives employment to 120 hands, men and girls. There are two large furnaces, also a patent "lier" for tempering glass; the latter is of their own invention.

VERONA TOOL WORKS, Metcalfe, Paul & Co., Proprietors. These works are located at Verona, on the Allegheny Valley Railroad, at ten miles distance from the city of Pittsburgh, and first commenced operations in 1873. The premises contain six acres of ground, on which are now erected the buildings. There are five forges, with places for five more; two large and three small furnaces, and a machine shop. The works are well adapted for the manufacture of railroad track tools of every description; the special line of goods being track chisels, spike mauls, sledges, and napping and striking hammers. These are made entirely by machinery, and at one heat, there being no handwork on them, excepting finishing points or faces. The advantages in this mode of manufacture of steel tools are claimed to be great: but one heating of steel is required, thereby running no risk of overheating or burning the material, as is the case when tools are made wholly or in part by hand. The immense and uniform pressure given to the steel in forming the tools tends to improve its quality greatly, besides making a uniform tool. The firm also manufacture tools for blacksmiths, miners, and stone masons, and are prepared to do any forging required by railroads. The present capacity of these works is from 150 to 200 per hour of any one of these articles.

PATRICK LYON, the famous Blacksmith and Lock Manufacturer, was born in London, England, about 1779, and landed in Philadelphia November 25th, 1793. He was in many respects an extraordinary man, but it was accident rather than intellectual endowments which made him celebrated. This accident originated with the great robbery perpetrated in the Bank of Pennsylvania. Lyon had been employed by the directors to make alterations in the vaults of the bank and attend to the doors. While so engaged, impressions of the locks were taken, but this did not attract attention at the time. On Sunday, September 2d, 1798, in the height of an epidemic of yellow fever, the astounding discovery was made that the bank had been robbed of over $160,000; and as Lyon's celebrity in making and picking locks was so well known, it was at once conjectured that he was the burglar. What still further added to the suspicion was his absence from the city. He had gone to Lewistown, Delaware, to escape the pestilence. As soon as he heard of the charge against him he returned and delivered himself up. Bail was asked to the amount of $150,000, and in default he was committed. He suffered terribly in prison, for the yellow fever was raging there. Subsequently the bail was reduced to $6000, and he was released. The grand jury ignored the bill, and he thereupon sued the bank and recovered $12,000 damages. It was subsequently ascertained that the bank had been robbed by the inside porter and another, who being taken down by the fever made a confession, and nearly all the money was recovered. Lyon in after years was celebrated as the builder of the famous hand fire-engine used by the Diligent Engine Company of the Volunteer Fire Department, which in its repeated trials with the "crack" engines of other cities carried off the victory both as to vertical and horizontal streams. He lived to a ripe old age, and died in his adopted city, respected by all who knew him. His portrait, at full length, is the property of the Academy of Fine Arts, and represents him while working at the forge.

IRON CITY FOUNDRY, Dickson, Marshall & Co., Proprietors, Pittsburgh. In 1863, Thomas Marshall, one of the present firm, originated the business, having a capital of about $6000, together with his experience as a practical moulder. He located at the corner of Twenty-third and Liberty streets, Pittsburgh. Having no specialty at the time, he undertook the general founding business, employing a force of fifteen men, and being himself one of the most industrious of operatives. In January, 1864, a partnership was formed by the admission of Robert Dickson and L. M. Morris, under the present firm-name, and the business was largely extended. The premises, comprising a block bounded by Liberty, Twenty-third, and Twenty-fourth streets, and a portion of the block bounded by Penn street, were purchased by the new firm, and they commenced the manufacture of mill work, which they followed until 1870, when they undertook the business of making all the machinery, etc., required in blast furnaces; this they made their specialty. The technical part of the business has been entirely under the management of the original proprietor, whose practical knowledge has materially aided to make the works a success; and this success is to be attributed not only to good workmanship, but also to promptness in executing orders, and to the general management of the business. There are now about 160 hands employed, and the products are estimated at $250,000 yearly.

CULMER SPRING COMPANY: Andrew Howard, President; Henry A. Breed, Secretary and Treasurer, Pittsburgh.—This company was incorporated, June, 1873, with a capital of $100,000, for the purpose of manufacturing railway car springs. The business had been started, in February, 1872, by the corporators as individual members of a firm. There are about twenty-five hands employed, and the works produce more springs than any other establishment in the city. Every spring leaving the hands of this company is manufactured from the best grades of cast steel that can be obtained in the market, and is made in the best manner known, being carefully tempered in view of the work to which it is to be applied. Every spring is thoroughly tested to its utmost capacity, the spirals being repeatedly and completely closed under pressure. The company believe that a first quality of cast steel, after being carefully and properly worked, is the most reliable of elastic material, and they use no other substance in connection for the purpose of holding up the steel. They manufacture equalizing bar springs for passenger cars, miller buffer springs, narrow gauge, besides other and special forms to suit especial cases in size or burden. Their capacity is such that they are enabled to fill all orders promptly; and they guarantee all springs which they manufacture to give perfect satisfaction. John W. Culmer is the present Superintendent; from him the company is named.

RIESECK & BROTHER, Safe Manufacturers and Machinists, Pittsburgh. This firm, composed of George and John Rieseck, began business together, in 1860, having a capital of about $5000, and leased the premises on Seventeenth street, where they engaged in general machine work jobbing, being principally occupied with brewers' materials. After having been in operation for about three months, they found it necessary to employ hands to assist them in the prosecution of their business. The manufacture of fire-proof safes originated in the fact that they required one for their own use, and resolved to build it. One of the brothers had worked at that business in Cincinnati, and he constructed it. Orders, after a while, were received from several merchants for similar fire-proofs, and the business, from being an episode, became a specialty, and was regularly established. When the great fire at Parker's Landing occurred, there were about sixteen of their safes at that locality, which withstood the severest tests to which these articles can be subjected, and proved their quality to be equal to any in the country. Their business has steadily progressed, and they are now employing 150 hands and using about $200,000 per annum. In the autumn of 1871, they removed to their present location, which afforded a larger space and is in every way adapted to their increasing business. Their works are now at Pyke and Sixteenth streets, having a front of 100 feet and a depth of 117. At the State Fair, held in Pittsburgh, in 1870, they obtained the premium for their fire-proof safes.

GEORGE RIESECK was born in Germany, in 1831; and JOHN RIESECK in the same country, in 1838. Both served their time in the same shop in Pittsburgh, and by uniting their energy and talent have achieved the success which always attends well-directed efforts.

DICKSON, STEWART & CO., Coal Merchants, Miners and Shippers, Pittsburgh. This firm commenced business in 1852, and comprised the following partners: Thomas Dickson, John Dickson, Robert Dickson, Joseph Dickson, Thomas C. Dickson and J. S. Stewart. In that year they purchased and opened the Oak Hill Mines, situated in Allegheny county, on the line of the Pennsylvania Railroad, and were the first to bring coal into Pittsburgh by rail. In 1855, they opened the Spring Hill Mine, and after working it for some time disposed of it to the Westmoreland Coal Company. Subsequently, they opened a mine contiguous to Oak Hill, and in 1857 opened and operated the Penn Mines, on the Allegheny road. In 1863, they opened and worked a large mine called the Sandy Creek, since sold to the New York and Cleveland Gas Coal Company. In 1864, they opened new mines on the line of the Pennsylvania Railroad, called the Swissvale; and, in 1866, another on the Pan Handle road, termed the Willow Grove. In 1867, they purchased a mine which had already been opened by Spark, Chalfant & Co., on the Allegheny Valley Railroad. All these mines are within a radius of twelve miles of Pittsburgh. In 1869, they formed themselves into an incorporated company, termed the New York and Cleveland Gas Company, for those particular mines already described. In 1872, in conjunction with Shoenberger

& Co., they purchased a large tract of coal lands within seven miles of the city and on the line of the Pennsylvania Railroad, termed the Hampton Coal Works, which are now in operation. Some of the coal in that tract cost $1000 per acre, and in the same neighborhood, only twenty-two years ago, the same land was worth but from $50 to $150 per acre. The firm have invested about $800,000. Thomas Dickson died in 1865, but the business is carried on by his sons under the same firm-name. In January, 1874, Mr. Stewart was struck by a train and killed; his heirs continue to have a share in the business. The coal is shipped principally West and North, the largest consignments being made to Chicago, Buffalo and Oil City.

FREDERICK GRAFF, the builder of Fairmount Water Works, was born in 1774. At an early age he was apprenticed to the carpenter's trade, and served his time, becoming thoroughly conversant with the art. A short time after attaining his majority, he met with an accident which entirely incapacitated him for the trade he had learned. While still on crutches, he chanced to meet H. B. Latrobe, the architect of the old Pennsylvania Bank, who employed him to make the working drawings for that building. In 1799, he was engaged as draughtsman and assistant engineer in erecting the first water works for the city. After this improvement had been completed, he went to Virginia, where he remained some years, and on his return to Philadelphia again became an assistant at Centre Square, and in 1805 was made superintendent. These works were very insufficient to supply the city, and it soon became necessary to provide others having more capacity. The site at Fairmount was purchased, and work commenced in August, 1812. The entire establishment was designed and executed by him, with the exception of the steam engines; at the same time he continued the management of the old works at Centre Square. He designed the canal and locks on the west side of the river; the forebay, head arches with their gates, the reservoirs, mill buildings, pumps, in fact, everything except the dam and the first three wheels. He devised and perfected the iron pipe system, the cast iron water-wheels to supersede those of wood, the stop-cocks, fire-plugs, etc. All these emanated from his genius, there being no other water works in the country to serve as a guide, while those of Europe were far inferior in design and capacity to what was here erected; in fact, he sent to England patterns of fire-plugs and stop-cocks which were acknowledged to be superior to anything of the kind known there. In the year 1833, while upon duty, he contracted the seeds of that disease which at a later period had a fatal termination. He died, April 13th, 1847. In addition to Fairmount, he supplied the detailed information to upwards of thirty-seven corporations that have erected water works in this country, including New York and Boston.

SMITH & CAMPION, Cabinet-makers and Manufacturers of House Decorations, Doors and Sash from Hard Woods; Finishers and Furnishers of Steamship Cabins, Fine Furniture of every description, Curtains, etc., have their works located at No. 249 South Third street and at Nos. 219, 221 and 223 Levant street, Philadelphia. In August, 1869, a co-partnership was formed by William Smith and Richard R. Campion, for the prosecution of the cabinet-making and general furnishing business, under the firm-name of Smith & Campion; and about eighteen months thereafter Joseph Horner Campion, the father of the junior member and formerly of the firm of Moore & Campion, became a partner. This firm became the pioneers in the production of house decorations and other fine work of the same character. The warerooms, at 249 South Third street, are in a four story building, 27 feet front, extending back to Levant street, and contain a large assortment of the choicest specimens of furniture of various descriptions, decorations, steamship fittings, curtains, hangings, etc., all of which are finished in the highest style of artistic skill. The factory is a fine six story building, 36 by 130 feet, exclusive of offices, engine and boiler rooms and other additional buildings. The motive power is derived from a first-class steam engine, and all the machinery and tools are of the most approved patterns. The works have a capacity for 250 hands, which number are frequently employed. All the heating and drying is done by steam, conveyed from the adjoining building, thus avoiding the necessity for any fire in the factory. The arrangement is admirable and systematic; and none but the most skilful artisans are employed, while the materials used are all of the very best that can be procured. In this establishment all the doors and blinds for the new Masonic Temple were made, with the furniture, curtains, veils, etc.; the house also did the finishing and furnishing of the cabins of the American

Line of Steamships, which are unsurpassed in design and elegance. The same firm were also employed to fit and furnish the cabins of the "Columbia," for William P. Clyde & Co.'s line of steamers plying between New York and Havana; the latter house having heretofore had all such work done in New York. Many private residences in Philadelphia and vicinity have been supplied with their furniture and decorations, all of which attest the elegance and durability of their productions. Their goods are also shipped to various parts of the United States and West India Islands.

JOSEPH HORNER CAMPION was born, June 12th, 1808, near Vincentown, Burlington county, New Jersey, and is the son of a farmer of that State. After receiving an ordinary education, he was apprenticed, at the age of fifteen, to William B. Fling, of Philadelphia, with whom he remained until 1830, learning the cabinet-making trade. At the expiration of his term, he entered the employ of Loud & Brothers, piano-makers, of the same city, with whom he stayed two years, and subsequently passed one year with John Millington, manufacturer of models for philosophical instruments. He afterwards travelled in the West for a few months. On his return from this trip, he entered into the most important business connection of his life, forming, in 1835, a partnership with Thomas H. Moore, who had then recently established himself as a manufacturer of fine furniture at No. 261 South Second street, the present business stand of Moore, York & Howell. The new firm of Moore & Campion commenced with the determination to make nothing but first-class goods, and by adhering to this rule they soon gained a reputation which never left them and was the source of their remarkable success. After the financial crisis of 1857, they opened an extensive trade with several of the West India Islands, through different houses established there, from which they derived much benefit. By a system of strict economy they gradually increased their capital, and with it their manufacturing facilities, paying special attention to the neighboring and city trade, particularly the latter, in which they became the leading house. The well-known character of their goods brought orders from all parts of the country, especially from the South, producing a heavy trade with that region, which continued until 1859, when, by the exercise of their usual foresight, they deemed it advisable, on account of the impending troubles, to decline executing any further orders from that section on credit. Though losing trade by this course, they saved money by avoiding bad debts, and their business increased during the war and continued to do so afterwards. This long association, equally agreeable and profitable to both partners, was terminated in 1870, when the junior partner retired from the firm. During the whole of this period his business career had been one of unusual prosperity. There had been no change in the firm, no disastrous fire, nor any important financial difficulty to impede the onward course of the business, which from a very humble beginning had acquired, at the time he withdrew, a position of eminence. Although he retired from the firm of Moore & Campion with a view of relinquishing active business pursuits, he was subsequently induced to contribute his experience and skill in the new firm of Smith & Campion, and became a partner, February 11th, 1871. He is the father of three sons, one of whom is a partner of Smith & Campion, and the other two are engaged in what is technically known as the "druggist sundries" trade.

JOHN BAIRD, SONS & CO., Marble Importers and Workers, Philadelphia. This establishment was founded by John Baird, the senior partner of the present firm, in 1842, in a marble yard on Ridge avenue and Spring Garden street. It consisted then of only one small building; but from insignificant beginnings the business increased until it became one of the largest of the kind in the country. It embraced a space of 150 feet on Ridge avenue and 120 feet on Spring Garden street, while its average depth on both fronts was 100 feet. The number of hands employed was 100, and the warerooms were filled with elaborately carved monuments and mantels, not a few of which were exquisite specimens of the Phidian art. In monumental work especially his success has been most complete, and the chaste and classic productions of his works are to be found in the cemeteries of Philadelphia and other cities, the mausoleums of the South and the resting places of the dead throughout the Union. In 1871, he relinquished this branch of business and entered most extensively into the trade of importing Italian marble, and, by the aid of improved and powerful machinery, preparing this material for other manufacturers to finish. For this purpose the large and commodious property of the present firm was secured, on the left bank of the Schuylkill river, below Chestnut street bridge. The premises include a saw mill, measuring 75 by 250 feet; a wharf, the piers of

which are furnished with heavy shears and cranes for unloading vessels, and an ample yard for the storage of blocks. The marble imported by this firm is almost entirely brought from the world-famed quarries of Carrara, and is put on shipboard at the ports of Genoa and Leghorn. This beautiful marble, which has been such a valuable servant of the arts for ages, still holds its place as the finest in the world, and indeed, with the exception of the Parian marble, has no rival. The latter is the most pure, consisting almost entirely of carbonate of lime, and is consequently softer, somewhat more transparent and of a more visibly laminated texture than that of Carrara. These famous Italian mines may be justly considered inexhaustible. Notwithstanding the drain which they have so long sustained, the workmen are still employed only on the surface. The export from them of recent years is computed to have been, on an average, about 40,000 tons annually. By far the greater part of this quantity is imported into this country. Of the statuary marbles, the chief part is sent to France and England. Russia also uses this marble for her palaces and churches. The quantity of marble imported by John Baird, Sons & Co. amounted, in the year 1873, to 5000 tons. On the arrival of a vessel, the cargo is at once discharged, and the blocks of every size and shape are removed to the yard, whence they are passed to the saw-shop, as required, in order to be cut to the proper size. There are in this shop a great number of saws, which are driven by a steam engine of eighty horse power; and here the immense blocks are cut into various shapes for the market. Most of the products are sent to the Western and Southern States. The business is constantly increasing, and, as the demand for such material advances, the firm extend their facilities and improvements to meet these requirements. The firm also do a considerable trade in white linen rags, which are used for packing the marble in the ships, and are, in addition, a profitable investment, being sold for paper-makers' use. They import of these rags about 1600 tons annually. In 1871, two sons of the founder of the business, Thomas E. and John E. Baird, together with William M. Thomas, who had been in the employ of the house for more than twenty years, were admitted into partnership, and the style became, as at present, John Baird, Sons & Co.

JOHN BAIRD, the senior partner, was born in 1821, in Ireland, and came with his parents to America when but two years of age. The family settled in Philadelphia, where he received his education and learned his trade. When twenty-one years old he embarked in the business which has resulted so fortunately

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CONESTOGA STEAM MILL, No. 4, Shenk, Bausman, Carpenter & Co., Proprietors, Lancaster. On March 16th, 1858, Benjamin F. Shenk, Jacob Bausman, H. Carpenter, M. D., John L. Atlee, M. D., John Baer, Abraham W. Russel and Thomas Baumgardner entered into a co-partnership and purchased the property now known as Conestoga Mill, No. 3. It was at the time supplied with machinery, but many improvements were introduced. The mill is situated on the east side of Prince, between German and Conestoga streets, has a frontage of 250 feet and is 60 feet deep; is three stories high, with an attic. Steam power was supplied by a 200 horse power engine; the working force was 275 hands and the production about 64,000 yards per week. The business increased from a production of 1000 pieces of goods per week to 1600 pieces, and the capacity of the mill was correspondingly increased. In 1864, the death of John Baer and withdrawal of A. W. Russel reduced the number of members to the standard at which operations were commenced in Steam Mill No. 4. This mill had previously been occupied and used as an agricultural manufactory. It is located on Beaver street, near Hazel, and was, at the date of its occupancy by the present firm, about 80 by 30 feet, and three stories high, with basement and attic. It was immediately enlarged by an addition of 50 feet, corresponding to the original building. It started with eighty looms in operation and a working force of about eighty men, women and boys. Its production was about 85,000 yards of muslin per month. The original organization as a firm still exists, and the working capacity remains about the same. The machinery has mostly been replaced by the latest inventions—the looms are of the Otis Pettee make, the cards are Mason's, with improved self-strippers, and the speeders and stabbers are Higgins' improved pattern, built in England. The goods turned out by this establishment are of the first grade, and find a ready sale in the best markets. Much of the success of the mill is due to the intelligent management of D. W. Bissell, the superintendent.

B. F. SHENK was born in Martic township,

Lancaster county, Pennsylvania, and is the third son of J. A. Shenk, a prominent farmer of that county. After receiving a common school education, he followed farming until the age of thirty-one, when he engaged in stock dealing, at which he continued for one year. In 1848, he commenced the coal business in Lancaster city, and in that and the lumber trade he remained until 1858. On March 17th, 1858, he became identified with Conestoga Steam Mill, No. 3, as financial manager, which relation he still maintains. In 1870, he was elected Treasurer of the Lancaster Fire Insurance Company, and in September, 1872, was made secretary of the same; both posts he now holds. In 1869, he engaged in coal mining operations in the Enterprise Colliery, of Shamokin Valley, one of the most successful mines in Pennsylvania, producing 15,000 tons per month. He was first married, in 1835, to Barbara Barr, daughter of a prominent farmer of Bart township, Lancaster county. The lady dying in 1847, he was married to Catharine Christ, of Lancaster city; he has five children living. He is a prominent member of the First Methodist Church and a most valuable citizen, attending actively to all the numerous important interests intrusted to him and in which he is engaged.

DENNIS WENTWORTH BISSELL, Superintendent of the mill, was born in Otsego, New York, February 20th, 1821. When ten years of age, his parents removed to New Berlin, New York. Though obliged to labor two-thirds of his time, after reaching his tenth year in J. Moss's cotton mill, he still managed to obtain an education at the New Berlin Academy. At eighteen years of age, he had gained the post of overseer of a department in Moss's mill. On attaining his majority he travelled through the Eastern States, to gain further knowledge of his business. In 1844, he assisted in starting the Eaton Cotton Mill. About 1854, he became Superintendent of Utica Steam Cotton Mill, where he remained until 1857, when he removed to Lancaster, to take charge of Conestoga Steam Mill, No. 3. He has continued to reside in the city since that time, with the exception of a few years during and after the civil war. He has always been a total abstainer from intoxicating liquors and a warm advocate of temperance. He is a fine musician, vocal and instrumental, and active in the cause of religion, to which he devotes a large portion of his time. He was married in New Berlin, New York, in 1843, to Sarah A. Lamphea, a lady of that place.

ADAMS & CO., Glass Manufacturers, Birmingham, Pittsburgh. This business was originally established by the firm of Adams, Macklin & Co., in 1851, at the corner of Ross and Water streets, Pittsburgh. The senior partner had some years previously discovered that lime was a good substitute for lead in the manufacture of glass, and this firm had started with the intention of making table ware with lime as an ingredient. At that time materials for making glass-ware were very crude, manufacturers being obliged to use soap-makers' ash, and the glass produced was very inferior. The lime glass met with opposition, as some of those who used lead in their works spread a report that the new glass would become opaque and be changed into mortar when winter approached. The business, however, was a success, and the firm were able to dispose of their products as fast as made. In 1854, Macklin died; but the firm-name remained unchanged until 1861, when the present style of Adams & Co. was adopted. In this year, also, the works were removed to their present location on Tenth street, in Birmingham, and commenced the manufacture of lamp chimneys and bottles, in which they were engaged for five years. Of the former article they made literally millions; the discovery of petroleum giving their business a great impetus. In 1866, they commenced again the manufacture of table ware; and among other articles, the very unusual ones of plow-shares, washboards, and coffins. The amount of capital at present invested is $125,000, employing 175 hands, and producing about twenty-five tons of glass per week.

JOHN ADAMS, the senior partner, was born, 1823, in Westmoreland county, Pennsylvania, and received but a limited education. When fourteen years old he commenced learning the glass-blowing business with Bakewell, Pears & Co. After he had completed his apprenticeship, he went to St. Louis in 1845, and was engaged as a journeyman by the firm of Case, Nelson & Eaves. Soon after he commenced work both Case and Nelson withdrew from the concern, and the remaining partner was not possessed of sufficient means to procure the lead wherewith the glass was to be manufactured. It was at this time that he discovered lime was a good substitute, and he made enough there to establish the fact that it was a veritable success. He made the first piece of glass ever blown or manufactured in Missouri with lime as an ingredient, and as a substitute for lead, and this new mode has been of late years almost universally adopted by the

trade. Business, however, became depressed in St. Louis, and he returned to Pittsburgh. He found employment with the firm of William McCollough & Co., where he learned bottle blowing, which may be considered another trade. He remained there two years, and then worked one year for S. McKee & Co. By this time he had saved $500, and with this small amount of capital he organized the firm of Adams, Macklin & Co., as already stated. He is a Director of the Iron and Glass Bank, President of the Herald Printing Company, and a Director of the South Side Cemetery. He is also a prominent advocate of total abstinence.

UNION FORGE AND IRON MILL, Wilson, Leggate & Co., Pittsburgh. These works were established, in 1860, by Carnegie, Kloman & Co., for the manufacture of bar iron, and also bridge and railroad iron. At that time the mill contained seven puddling and three heating furnaces. This firm were so successful in their operations that they erected a larger establishment further up the river, and, in January, 1873, disposed of their late works to the present co-partnership, composed of John T. Wilson, James R. Wilson, Alexander Leggate, Howard Morton, and John Walker, who have continued the same, adding thereto new railroad specialties, such as patent legs, pins, and draw bars. They also increased the appliances of the mill, which now include fifteen puddling and six heating furnaces, with a guide mill, and a large quantity of labor-saving machinery, the invention of the senior partner. The present works give employment to 225 hands, and can produce 700 tons per month; and have, in the same period, made 200 tons of forged iron. One of their specialties is hammered railroad axles made from fagots. These give greater tenacity than those manufactured from scrap iron. Their patronage extends throughout the country; the principal railroad companies in the United States being their best customers.

JOHN T. WILSON was born, 1831, in Scotland, and came to the United States in 1845. He is by trade a blacksmith, and was in the employ of the Pennsylvania Railroad Company for nine years, and was a foreman with the same for five years. Through his various inventions he has built up the business with which he is connected.

JAMES R. WILSON is a native of Pittsburgh, and was for many years connected with the Pittsburgh Car Works. He was also a resident of California for a number of years.

ALEXANDER LEGGATE was born in Scotland, and came to this country when young. He was a large operator in real estate, and successful in accumulating a competence, which enabled him to purchase a share in this business.

JOHN WALKER is a son of Hay Walker, of Allegheny City, and is possessed of good business abilities, and manages the financial department of the firm very satisfactorily.

SWEDE AND ST. CLAIR FURNACES. James Lanigan, Proprietor, Philadelphia. These furnaces are three in number; two of them are situated at Swedeland, near Norristown, Montgomery county, and one at St. Clair, Schuylkill county. The Swedeland property is situated on the Schuylkill river, and comprises an extent of about seventy-five acres. The buildings on the settlement consist of a stone stock house 125 feet long by 100 feet wide; a machine shop 100 feet by 30; a foundry 100 feet by 30; and some 30 brick houses for the workmen, etc. A railroad track is laid into the works, connecting them with the line of the Reading Railroad. The height of the stacks of both furnaces is 60 feet, and the diameter of the boshes is 16 feet. The ores used in the works are both the hematite and magnetic; the hematite being produced on the spot, and the magnetic brought from New Jersey and New York. The average capacity of production is about 200 tons of pig-iron per week from each furnace, or about 22,000 tons per annum. In the production of one ton of iron about five tons of material are consumed; of the ore two tons, or if inferior in quality somewhat more; of limestone one ton; and of coal from one and a half to two tons. The number of hands employed on the Swedeland Works is altogether about 100; those employed at the furnaces numbering about forty, and the miners and those in the limestone quarries about sixty. The St. Clair Works are situated in the town of St. Clair, near Pottsville, and include about nine acres. They have only one furnace, which was built in 1872, and is of nearly the same size as the Swede furnaces, with the exception of the bosh, which is but fifteen feet in diameter. The same description of ores is used here as those reduced in the Swede furnaces. There being no mines, however, on this property, the ores used are

brought from various parts of the country. The capacity of this furnace is nearly the same as those at Swedeland; the average annual production being from 8000 to 10,000 tons of pig-iron. The number of hands here is twenty-three. The buildings are a stock house 150 feet by 90, and the necessary accompaniments, such as blacksmiths' and carpenters' shops, etc. The engines in all three of the works are alike; they are upright engines of 200 horse power; the cylinders being 46 inches in diameter, and the blowing tubes having a 7-foot stroke and being 7 feet in diameter.

JAMES LANIGAN, proprietor of the above-mentioned furnaces, was born in Pottsville, in the year 1829. In the earlier part of his life he was engaged in the coal business; in 1863, he became connected with the iron interest, and established a rolling mill and the St. Clair furnace, and in 1865, added the Swede furnaces.

KITTANING COAL COMPANY. H. H. Shillingford, President; H. T. Shillingford, Secretary and Treasurer. Office 125 South Fourth street, Philadelphia. This company was incorporated July 10th, 1862, with a capital stock of $50,000, which has been since increased to the sum of $500,000, divided into 10,000 shares, of the par value of $50 each. The said capital stock is now represented by 8000 acres of coal underlying the lands of the Moshannon Land and Lumber Company, in Clearfield and Centre counties; by about 1000 acres of land (in fee simple) and coal rights in Blair and Cambria counties; and by about 900 acres of leased coal lands in Clearfield county. There are at present five drifts or workable openings on these lands, capable of producing and shipping 1500 tons per day, having all the necessary railroad tracks, sidings, schutes, platforms, mine cars, and mules for a business of that extent; and, with a comparatively small outlay for additional improvements, said capacity can be doubled in a very short space of time. The lands in Clearfield and Centre counties are reached and the coal transported over the Beaver branch of the Tyrone & Clearfield Railroad, forming a junction with the Pennsylvania Railroad at Tyrone, and can thence be forwarded along the line of the different railways to the shipping points at South Amboy (New Jersey), Greenwich (Philadelphia), and Canton (Baltimore), for re-shipment to all Northern, Eastern, and Southern ports, and for the supply of ocean steamers from New York, Philadelphia, Baltimore, and Norfolk. Large supplies are also shipped to the West India Islands, Mexico, and Central America. The principal seam or vein of coal now worked in the Clearfield region underlies the whole body of lands above water level, and but little of said vein or seam has ever been found or developed outside of the same, although most diligently sought for; and, as now believed, does not exist. The analysis of coal from this vein has been made by Professor Charles H. Seeley, of New York, and he reports as follows: One hundred parts contain volatile combustible matter, 20.10; fixed carbon, 76.39; ash, 3.51. Coke, 79.09; sulphur, 0.19. The small percentage of sulphur and of ash, as well as practical tests of the coal by coking, and burning in various ways, indicate that for metallurgical purposes, as well as for making steam, it is of the first quality. The analysis made by Professor C. F. Candler, of New York, and that by Booth and Garrett, of Philadelphia, substantially agree with Professor Seeley, though in some respects they both show a better result; while the certificates of several parties report better actual working results than any of the analyses indicate. The lands in Blair and Cambria counties are on the line of the Pennsylvania Railroad, at and about Gallitzin—the Summit Tunnel penetrating said lands, and the operations of the company being conducted at the eastern end of the same. These lands are underlaid with the celebrated Lemon and Miller veins, or seams of coal; the former so well and favorably known to the brick-burning trade, as possessing qualities—not at present known to exist in other coals—of producing the rich, full-red color for which Philadelphia pressed bricks are so justly distinguished wherever known. The company own 231 eight-wheeled cars, and to that extent they are not dependent on the railroad companies for the means of transportation. When the company was first organized, its operations were confined to the lands it owned in Blair county, at the east end of the Pennsylvania Railroad tunnel, already referred to. Subsequently the coal rights in Cambria county were procured by purchase, and afterwards the Moshannon Land and Lumber Company disposed of all the coal underlying their lands, in the counties already named, to the Kittaning Coal Company, and the capital stock was increased to embrace said purchases. The developments in Clearfield county were commenced by the company on leased land in 1868, and the further developments to reach their own lands were initiated in 1871. The several collieries at present worked by this company are named the "Franklin," "Philadelphia," "Beaver," and "Tunnel Hill." The

Directors of the company are (1875) Henry H. Shillingford, Charles W. Trotter, George Howell, Charles W. Poultney, Alexander J. Derbyshire, H. N. Burroughs, and Zopar C. Howell.

HENRY H. SHILLINGFORD, President, was born, October 11th, 1815, in Upper Darby, Delaware county, Pennsylvania, and received the ordinary education afforded by the common schools of his native village. When ten years old he commenced to learn a trade under his father's supervision—that of a black and white smith—and remained with him until he was eighteen. During all these years every leisure moment was devoted to study, and the result of this was, as soon as he had completed his trade, his selection as an assistant teacher in one of the village schools, which duties he faithfully discharged. He next became a clerk in a small country store, left that for a similar position in another, and finally, in 1836, moved to Philadelphia, where he was variously employed, first in a rag and paper warehouse, next in the office of the *Saturday Evening Post*, and as chief salesman with Shoemaker & Love. In this latter position he displayed such excellent business qualifications that, on the retirement of the senior from the firm, he became the junior partner in the firm of Love, Smith & Shillingford. When this partnership dissolved, he became agent for several prominent English houses, for whom he transacted a large and constantly increasing business in Boston, New York, Philadelphia, and Richmond. He continued in these agencies until 1858, when he was compelled to relinquish them to devote his time and attention to the interest held by himself and his brother-in-law, George Howell, in the Clearfield Coal & Lumber Company. At the breaking out of the rebellion he was Secretary and Treasurer of the Tyrone & Clearfield Railroad Company, of which General R. C. Hall was, at that time, President. General Hall was soon appointed Quartermaster-General of Pennsylvania by Governor Curtin, and he himself was commissioned Assistant Quartermaster-General, with the rank of Colonel, with his headquarters in Philadelphia. At the time the war commenced he was also acting as Secretary and Treasurer of the Atlantic & Ohio Telegraph Company, and also as a Director of the Western Union Telegraph Company. He has, however, devoted his time of late years to the development of the coal and lumber interests of the State. When, in 1858, he assumed the superintendency of the affairs of the Clearfield Coal & Lumber Company, that concern had become a total wreck. But by his shrewd management this corporation was merged into the Moshannon Land & Lumber Company, of which he is the present executive officer, with a capital of $500,000; and, in 1862, as already stated, organized the Kittaning Coal Company.

PITTSBURGH CITY FLOUR MILLS, Marshall, Kennedy & Co., Proprietors, Pittsburgh. This establishment was originated, in 1850, by the firm of Willmarth & Noble, who operated the mill for thirteen years, and manufactured about 400 barrels of flour per day. In 1863, the business was purchased by J. S. Liggett & Co., the partners being J. S. Liggett and John Lindsay, who operated the mill until 1871, when A. M. Marshall, D. Rutton, F. H. and W. M. Kennedy purchased the same, who introduced new machinery as regards cleaning the grain and separating the flour from the bran, and increased the capacity to manufacturing 600 barrels per day. The mill is at the corner of Liberty and Fifteenth streets.

A. M. MARSHALL came to Pittsburgh when very young, and followed the mercantile business for many years

D. RUTTON has been connected with the mills since 1863, having been in the employ of J. S. Liggett & Co. during their entire connection with the same.

F. H. and W. M. KENNEDY are the sons of R. I. Kennedy, of Allegheny City, well known in the mill business.

RELIANCE MACHINE WORKS, B. F. Quimby, Proprietor, Philadelphia. This business dates from March 1st, 1874, when the works started with a force of twelve men, and a capital used in the business of about $25,000. The location is in Tatham's fire-proof building, Nos. 224, 226, and 228 South Fifth street, Philadelphia. The articles manufactured are fine machinery, screws, taps, dies, punches, special drills, models, etc., the business being what might be termed a general "job" establishment, including milling, planing, punching and fitting. The amount of business transacted during this, its first year, is between $30,000 and $35,000, having progressed steadily from month to month, so that now forty hands are employed. About two-thirds of these are specially

A. A. Shillingford

engaged in the manufacture of three articles, which may be termed the staple products of the works. The specialty, however, is in machine screws, which heretofore have so largely engaged the attention of Eastern manufacturers, who have hitherto monopolized the trade. The works have been steadily increasing and extending their products and trade to other cities, and have recently closed large contracts with New York and Chicago.

BENJAMIN FRANKLIN QUIMBY was born, October 13th, 1831, in Hopkinton, New Hampshire, of American parentage, his ancestry having been residents of New England since 1650: the family were originally from England, and of Norman-French extraction. After leaving school in his native State, he went to Chicago in 1852, where he engaged in the real estate business, and subsequently in banking: he afterwards became interested in the grain and commission business. He removed East in 1868, and since has been a resident of Philadelphia.

FULTON COTTON MILL, Lancaster—William M. Wiley of Philadelphia, and G. Calder, Jr., of Lancaster, Proprietors—was started in October, 1865, by Wiley & Co. The company then consisted of the following-named gentlemen: William M. Wiley, G. Calder, Jr., S. S. Spencer, O. J. Dickey, J. R. Bitner, C. A. Bitner, John W. Jackson, H. E. Muhlenburg. The success attending the manufacturing enterprises of a similar character induced the above-named gentlemen to embark in this venture. George Calder and S. S. Spencer were the first to move in the matter. A location was selected on the corner of Duke and Lemon streets, and a substantial two story brick building was erected, 140 by 50 feet, including engine house. Operations were actively commenced early in 1866, with a working force of about seventy-five hands, and an average production of 60,000 yards per month. On October 1st, 1870, at the expiration of the limited partnership entered into by the company mentioned, several of the members retired, and Wiley & Calder assumed the sole proprietorship. The establishment has been actively run ever since its start, with its full complement of hands. The capacity of the mill has been increased materially by the introduction of improved machinery, and the working force at the present time is 100 hands, with a monthly production of 75,000 yards, consuming annually about 1000 bales of cotton. The steam power is furnished by Best's tubular boilers. The engine is Corliss pattern, seventy horse power, high pressure. The success of this enterprise is due to the very superior quality of the goods manufactured, and to the fact that all the productions are directly disposed of to jobbers without passing through commission hands.

WEST CHESTNUT STREET IRON WORKS, Lancaster; Harberger, McCulley & Co., Proprietors. The foundry business has been carried on at the present location since 1845. During the year 1860, a co-partnership, entered into under the name of Paulic, McCulley & Co., obtained control of the establishment, and conducted it for two years, when Paulic parted with his interest to A. J. Harberger. In the course of the same year the old buildings were destroyed by fire, but steps were immediately taken to construct the present buildings, which were finished in 1861. The location has a frontage of 240 feet and a depth of 160 feet. The buildings are of brick, two stories high. The machine shop is 40 by 100 feet; the foundry 60 by 80 feet; boiler house 40 by 9 feet; blacksmith shop 51 by 40 feet. The motive power is derived from a fifteen horse-power horizontal engine of their own manufacture. The works are provided with the requisite machinery and all appliances necessary to follow a general custom and jobbing trade. The period when this business was fairly started was most inauspicious, for the civil war had broken out, which had the effect of paralyzing industry. For a time the consumption of iron did not average twelve tons per month, while the hands employed numbered only thirteen. The contrast furnished by the present state of their business is very striking, and shows the perseverance, industry and business capacity of the members of the firm, who are A. J. Harberger, R. C. McCulley, and H. W. Harberger. The consumption of iron at the present is forty tons per month, and the employés number forty-five. Castings of three tons have been turned out, but the capacity of the foundry permits of turning out castings of five tons' weight, and the quality of the metal is of the best.

H. W. HARBERGER was born in Philadelphia, August 24th, 1821, his ancestry dating back to the very earliest history of the country. His grandparents figured conspicuously in the Revolutionary War, while his father served in the army of 1812, as First Lieutenant of the Washington Blues,

under Captain Robert Patterson. He himself was educated in the private schools of Philadelphia. At the age of sixteen he became an apprentice of William Morris, of the celebrated Morris Locomotive Works, and served for six years. After working as journeyman for one year, he became junior foreman in charge of a floor. Steadily advancing to higher grades, in 1852, he was appointed General Manager of 1200 workmen. In 1859, he established himself in the general machine business at Thirtieth and Chestnut streets, near Chestnut street bridge. In 1861, he removed to Lancaster and joined the present firm organization. For several years he was a member of the City Council, and is a very prominent member of the Masonic brotherhood.

LANCASTER HARNESS LEATHER AND BELTING MANUFACTORY, Thomas F. Cooper, Proprietor. The business was commenced, April 1st, 1869, by Lowell & Cooper, on West King street. At the end of two years they removed to the Pennsylvania Railroad depot, on Chestnut street, and occupied a building two stories high and 30 by 60 feet. Mr. Lowell's interest was bought by Mr. Cooper in July, 1874, and a wholesale and retail trade, in every respect most prosperous, is now carried on by him alone. Originally the business was limited to the requirements of Lancaster and its environs, and did not include the manufacture of belting; now the products are 200 per cent. greater, and the belting is used in Philadelphia and throughout the State; also in New Jersey and the Eastern States. The harness leather, which is a special feature in the productions, finds a ready market. The business is steadily increasing, and promises to occupy a prominent position among the manufacturing interests of Lancaster city.

THOMAS F. COOPER was born on the island of Bermuda, August 6th, 1847, and received his early education in the private schools of that island. Leaving school at the age of sixteen, he travelled for a period of two years in the West Indies, and then proceeded to the United States. After visiting the principal cities of the Union, he located in Lancaster, where he served a term of four years at the leather finishing business, with A. A. Myers, and on the completion of his apprenticeship worked as a journeyman for four and a half years. In 1869, he associated himself with Mr. Lowell in the manufactory on West King street. In 1872, he married a Philadelphia lady, the daughter of an officer of the United States Army, who distinguished himself highly in the War of the Rebellion. He belongs to the Lutheran Church, and is a prominent member of that body. The success which has attended his efforts is owing to his thorough knowledge of the business, great care, and large executive ability.

UNION AGRICULTURAL AND SPOKE WORKS, Lancaster; Samuel Keeler, Proprietor. Business was commenced in the fall of 1853, in South Duke street, in a frame front building of one story, 65 by 35 feet, and a two story brick back building 30 feet square. At first only two hands were employed. Trade increasing, the proprietor, in 1864, united to his other manufactures that of spokes. In 1870, he sold the above property and purchased a lot on Prince and Lemon streets—120 feet on Prince, 170 feet on Lemon, and on Water 160 feet. On Prince street he built a two story brick shop 70 by 35 feet; on Water street a one and a half story brick building 65 by 55 feet; and a dwelling house of three stories 32 by 30 feet. The hands now employed in the works number thirty-five, and they produce grain drills, fans, corn shellers, etc., to the extent of over 1000 yearly; besides 200,000 spokes, and bench material to the amount of 50,000 feet of lumber. The motive power is a twenty-five horse-power stationary engine, and the machinery is of the latest pattern. The establishment is one of the most successful of its kind in the State, and the owner, who is a practical mechanic, superintends the details, allowing nothing but the best quality of goods to leave the premises. The market for the products is found in this State, also in Maryland and Delaware.

SAMUEL KEELER was born, February 25th, 1825, in Montgomery county, Pennsylvania. His father removed to Berks county when Samuel was five years old. Here he received his early education at the public schools. At the age of seven years, having lost his father, he was thrown on his own resources, and labored on a farm until he was twenty-one years of age, when he began to learn the trade of a wheelwright and coach-maker in Chester county. Having served an apprenticeship of three years, he went to Reading and worked as journeyman in a car manufactory during two years. He then removed to Lancaster, and worked one year in an agricultural establishment as journeyman. At the expiration of that time he took a contract

for the manufacture of agricultural implements, from John Bamborough, and this led to his entering upon his present enterprise. He is a director and stockholder in the Mechanics' Building Association, and a member of the orders of the Odd Fellows and American Mechanics. In 1853, he married, and has a family of two sons. His success is attributable to his industry, perseverance and excellent business capacity.

ALLANDALE COTTON MILL, Lancaster, George Calder, Jr., & Co., Proprietors, was first put into operation in September, 1871. Certain buildings, on the corner of Chestnut and Plum streets, originally used by the Lancaster File Company, were purchased and the necessary machinery introduced for the manufacture of ducks and drills—dyed (blue and brown). The production of the mill at its first start was 50,000 yards per month, with a working force of 100 hands. The succeeding year the increase in demand for its goods caused an enlargement of the works by the erection of two wings and a dye house. The buildings now have a dimension of 250 feet on Chestnut and 120 feet on Plum streets, with a wing at the west end of 60 feet. There has been introduced a Corliss engine of 120 horse power, with six of Best's tubular boilers, which, with the machinery before employed, gives a working capacity of double the original status. The mill continues under the same successful management as at first, and now has a working force of 150 men and boys, and produces 120,000 yards per month, consuming annually about 2000 bales of cotton. It is under the personal management of Mr. Calder, and owes much of its success to his efforts. The firm are erecting, in addition to their already extensive buildings, new structures at the corner of Prince and Hager streets, on the line of the proposed narrow gauge railroad. These will be two stories high and 100 by 40 feet, with boiler house, 40 by 16, and will be used as dye houses for piece goods and a finishing establishment, and will be the only building of the kind in the interior or western part of the State.

GEORGE CALDER, JR., born in Boston, Massachusetts, April 29th, 1830, was the oldest son of George Calder, of Boston. His father, in 1835, removed with him to Montevideo, South America. He there remained for five years, when he returned to the United States and attended school in Philadelphia and Lancaster until he reached the age of sixteen. He then entered a mercantile house in Philadelphia, where he remained until his nineteenth year. In 1849, he went to San Francisco, and was for a time in the service of the Pacific Mail Steamship Company. He next commenced a mercantile business at Stockton, and was appointed City Treasurer. He remained in California until June, 1854, when he returned to Lancaster, Pennsylvania, and commenced the coal and lumber business in connection with his father, who was largely interested in the Lancaster and Susquehanna Navigation Company. George Calder, Jr., was more particularly interested in the Conestoga Transportation Company, between Lancaster, Philadelphia and Baltimore, his father being secretary and treasurer of the company. They kept up their connection with the Navigation Company until 1866, when operations were suspended. He then commenced, late in 1865, the Fulton Cotton Mill enterprise, which he still operates successfully, as well as the Allandale Cotton Mill. He is descended on the father's side from an old Scotch family; his grandfather was largely engaged in the East India trade, commanding his own vessel at the age of eighteen, and suffered many hardships and frequent capture and imprisonment. His maternal ancestry was of the distinguished Leland family, of Massachusetts. He married, in April, 1864, a daughter of Lewis Hurford, of Lancaster city.

DRILLING MACHINE MANUFACTORY. Thorne, De Haven & Co., Twenty-first street, above Market, Philadelphia. This firm are builders of portable, radial, multiple, vertical, horizontal and special drilling machines, their specialty being the portable radial drills, of their own invention and introduction, a novelty highly appreciated by the trade. These machines can be attached directly to the work and power applied to them in any position, drilling holes up to 2 inches in diameter with the same facility as a stationary drill. There are four sizes of these portable drills manufactured: No. 1 is for light work, drilling up to 1 inch in diameter, and weighs 125 pounds; No. 2 has more power and range, drills to 1½ inches, and weighs 200 pounds; No. 3 is the most popular and useful size, drills up to 2 inches, and weighs 240 pounds; while No. 4 is a portable drilling and boring machine, intended for heavy work, and will drill any size hole and bore up to 8 inches in diameter; this size weighs 390 pounds. The great advantages attending these portable

drills can be understood at once, in that they can be applied to the drilling of all pieces which are inconvenient to be moved, or which cannot be readily adjusted under stationary drilling machines. Moreover, when not in use on the floor, it serves the purpose of a bench drill press. Most flattering testimonials as to the value and efficiency of these machines have been received from the superintendents of the Southwark Foundry, Cramp & Sons' Ship and Engine Building Company; from William Sellers & Co., of Philadelphia; from the Hartford Foundry and Machine Company, the Fulton Iron Works, of St. Louis, the West Point Foundry, New York, and many others. The most eminent firms in the country are among their patrons, and they are used in the United States Navy Yards at Brooklyn and Washington. From Maine to California, and Minnesota to Texas, they have been supplied; also to the Dominion of Canada, Cuba, Peru, Scotland and Sweden. The radial drills are made of three sizes, measuring in length of arm 42, 48 and 60 inches respectively, and will drill and bore from 2 to 16 inches in diameter. The vertical drilling machines are also of three sizes, and drill to the centre of 24, 30 and 36 inches respectively. The patent multiple drilling machines drill from one to twenty holes at the same time, from one-half to 1 inch in diameter, in wrought iron or steel. The patent horizontal boring and drilling machine, particularly adapted to heavy castings and frames, will drill any size hole and bore up to 20 inches in diameter. The firm also manufacture gun blank drills, for drilling wrought iron and cast steel gun blanks, perfectly true, at high speed and at one operation. The Franklin Institute awarded the firm, at its fair, held 1874, the highest prize, a silver medal, as a reward of skill and ingenuity. The firm employ forty hands in their works, and dispose of all their products as fast as made; indeed, as a general rule, their orders are constantly ahead.

WATTSON & CO.'S CRACKER BAKERY, 157, 159 and 161 North Front street, Philadelphia. This bakery was founded by Thomas Wattson, in 1810. It has remained in the family during three generations, and is the oldest industry of the kind in Philadelphia. Its location has never been changed, and it is to-day one of the old business landmarks of the city. The founder conducted it unaided for many years, but in course of time his son, Thomas B. Wattson, and his son-in-law, John T. Ricketts, were admitted as partners. They then carried on the shipping and commission business in connection with the bakery. A dissolution took place some years later, and the founder retired for a time, but eventually resumed business at the old place. The commission and shipping business became a separate concern, and is still carried on by Thomas B. Wattson, the only surviving member of the old firm. Edwin Wattson, another son of the founder (now deceased), was a prominent member of the firm for many years. Death having stricken down nearly all those who composed the old firm, the style and title of Wattson & Co. was adopted, with William Wattson, a son of the founder, as the senior, and Thomas Wattson, a son of Edwin, as the junior partner. This change took place March 1st, 1875. The original manufactures consisted only of ship-bread and crackers, but gradually they came to include soda biscuit, family crackers and a great variety of fancy and other cakes. The building in which the business is carried on has a front of 80 feet, with a depth of 45 feet, running through to Water street. About fifty hands are employed, and the annual sales of the products have reached as high as $250,000. The house is a time-honored one, and the business integrity of its founder has ever been maintained by his descendants and successors.

THOMAS WATTSON was born in Elkton, Maryland, July 25th, 1788. He was a well-known merchant and manufacturer of Philadelphia, and, apart from this, was a highly-esteemed citizen. He was one of the founders of the Lewisburg University, and at the time of his death was the President of its Board of Directors. For half a century he was a member of the First Baptist Church, of Philadelphia. He was much interested in the work of the American Baptist Publication Society, and was also a warm friend of seafaring men. In 1813, he married Mary Brown, who survives him. His death, which was regretted by a large circle of friends, took place February 20th, 1874.

EDWIN WATTSON was born in Philadelphia, in 1821. He was well-known in the business circles of his native city. For many years he was engaged in the business founded by his father. He died, August 10th, 1873.

WILLIAM WATTSON, the present senior member of the firm, was born in Philadelphia, in 1832. From boyhood up he has been engaged in his present business. His undivided attention is

Thos. S. Watson

Edwin Watson

given to it, and he is thoroughly devoted to keeping up the reputation established by those who came before him.

KENSINGTON IRON WORKS, Henry Lloyd, Son & Co., Proprietors, Pittsburgh. In 1855, Henry Lloyd and George Black, who had been associated together for many years previous in the transportation business on the Pennsylvania Canal, established these works, and leased the premises situated on Monongahela street, in the Sixth Ward, the site being one of the oldest business localities in Pittsburgh. The capacity of the works was then about 4000 tons of bar and sheet iron yearly, which has since increased to 6000 per annum. The establishment covers five and a-half acres of ground, and furnishes employment to 120 men. By strict attention to business and unvaried punctuality in filling orders, the business has been conducted on a safe and reliable footing. The senior partner devotes his exclusive attention to the manufacturing department; while the junior partner, during his lifetime, had charge of the financial portion of the business. The latter died, August 5th, 1872, aged fifty-seven years. These gentlemen were associated together about thirty-two years, and both displayed remarkable aptitude in the several branches of the business they ultimately perfected. In the fall of 1874, Mr. Lloyd admitted his son into partnership, when the style of the firm became what it now is

JOHN A. GRIER, Manufacturer of the Valley Chief Mower and Self-raking Reaper combined, Mount Joy, Lancaster county. In 1852, the Mount Joy Car and Agricultural Implement Manufactory was built by a stock company, but did not prove a success. After a year's trial it was converted, in 1857, into a manufactory for reapers only, under the proprietorship of Marsh Brothers, who conducted it until the spring of 1866, when John A. Grier was admitted to a partnership, and the firm was continued as Marsh, Grier & Co. until 1872. At that time John A. Grier purchased the entire establishment, the Marsh Brothers retiring, and he at once proceeded to make the manufacture of the "Valley Chief Mower and Self-raking Reaper combined," a specialty. The factory is capable of turning out 1000 reapers per annum, though as yet it has not been worked to its full capacity. There have been 1500 machines built and sold, principally in Lancaster and the adjoining counties. The working force is about sixty hands, though the establishment could employ 150. The buildings are located on a lot embracing about one acre of ground, situated on Main street, at the east end of the town, and consist of a main structure of brick, two stories, and 150 by 40 feet; a brick foundry, 60 by 80 feet, and a saw mill, erecting shop and blacksmith shop of frame. The machine is steadily working its way into the good opinion of farmers, and promises eventually to be a valuable property to its manufacturer and a benefit to agriculturists.

JOHN A. GRIER was born in Chester county, Pennsylvania, June 9th, 1834, and was educated at the University of Lewisburg, Pennsylvania. At the age of seventeen he was apprenticed to the trade of machinist, and as such served for four years. He then entered the United States Navy, as Assistant Engineer, and in this service continued for ten years, passing through the several grades and attaining the rank of Chief Engineer, which he held in 1861, and in which capacity he continued during the war, in the "Powhattan," participating in numerous engagements and finally resigning in 1865. He settled in Mount Joy, Pennsylvania, and entered the agricultural implement business in 1866. Early in his naval career he served in the Mediterranean, and also assisted in laying the Atlantic Cable, in 1857, being attached to the "Susquehanna" at that time. He served also on the "Fulton," in the Paraguay Expedition, and on the "Crusader," in the expedition fitted out by the United States Government for the suppression of the slave trade on the coast of Cuba, in 1858, during the administration of President James Buchanan.

SOUTH ERIE IRON WORKS. William Henry, President; R. Liebel, Secretary; Adam Atcheson, Treasurer; Erie. This is an incorporated company, which commenced operations in December, 1868. The works are located on Peach street, south of the railroad depot. The area of ground is nearly an acre, measuring 100 feet by 330 feet, on which are erected a foundry, 41 by 225 feet, two stories high, and a stove-room, 23 by 80 feet, three stories in height; both of these are brick; there is also a frame store-room, 18 by 36 feet in dimensions. The articles manufactured are stoves, plows, cultivators, in fact, all descriptions of agricultural

implements, columns, etc., the value of the products being about $50,000 yearly. There are about thirty hands constantly employed, although the works are running only to about two-thirds of their capacity. The specialties are stoves and plows. The works are under the personal supervision of the President.

WILLIAM HENRY, President, was born, October 7th, 1824, in the county of Armagh, Ireland. He was but nine years old when he came to the United States, and was during the first year in Clinton county, New York. In 1834, he went to Erie. He began work with Vincent Himrod & Co., in 1842, as an apprentice to the foundry business, and remained in their employ for fifteen years. He next became a contractor on the Philadelphia & Erie Railroad, which proved a very successful venture for him. In 1858, he became a member of the firm of Atcheson & Henry, iron founders, on Peach street. In 1865, the senior partner disposed of his interests to a Mr. Bryant, and the firm became Henry & Bryant, and so remained until 1869, when the South Erie Iron Works was incorporated, of which he was elected President, an office he still continues to hold. He is a stockholder and director in the Humboldt Bank, of Erie, and was Burgess of South Erie from 1865 to 1869, when it became a portion of the consolidated city of Erie. Elected a member of the Select Council for three years, he served his term and retired in 1872. In the autumn of 1874, he was elected a Representative of the city in the State Legislature. He was also a member of the Volunteer City Fire Department for eleven years. He was married, 1851, to Catherine Crowley, of Erie.

PORTER, DEVITT & CO., Planing Mill and Wheel Factory, Jamestown. The business was originally established in 1867, by the firm of McGill & Truesdale, by whom it was operated until 1869, when it was purchased by George D. Devitt, E. Porter and S. Morrison, who constitute the present firm. The works are located on the corner of Jackson and Siper streets, and are built of frame, 50 by 75 feet, two stories high, with a wing. The articles manufactured are wheels, hubs, spokes, felloes, dressed lumber, etc.; and a specialty is made of the Stage & Holman Patent Carriage Wheel, of which about 1200 sets are produced yearly; the planing mill yields about 500,000 feet of dressed lumber during the same period. The firm propose to devote their attention henceforth exclusively to the manufacture of wheels and hubs. About twenty-five men are constantly employed.

GEORGE D. DEVITT was born, 1844, in Lincoln county, Canada West, of Canadian parentage. He began life as a clerk, and removed to Mercer county, Pennsylvania, in 1866, and was first employed by the firm of Runser, Carver & Trouts. He next embarked in the planing mill and lumber business, in which he continued until 1869, when he went to Jamestown and became interested in his present business, which has proved a success. He was married, December, 1873, to Mary, daughter of the late John S. King, of Sharon, Pennsylvania.

STENTON KNITTING MILLS, F. W. & T. S. Henson, Proprietors, Germantown, Philadelphia. These mills were founded by William Henson, about the year 1855. He commenced business in a very small way, and, as was the case with nearly all the large hosiery manufacturers of Germantown, his factory and dwelling were together. The quaint appearance of the main street of that old town is rapidly passing away; it was in one of the old-fashioned dwellings on the brow of Negley's Hill that the founder had his knitting-frames. This building is now the warehouse and storeroom of the mills, while the main building of the concern is almost hidden from view in the rear. Here the proprietor carried on a prosperous business for several years—in fact, acquired a competence. In 1862, he erected the factory building above referred to. It is 103 by 30 feet, and built of brick. The principal part of the machinery is here in operation. There are also outbuildings erected for various purposes. The mills are located in a very secluded spot, and the passer-by would not dream of their existence while admiring the substantial dwellings which hide them from view. The founder retired from business in 1865, leaving it to his two eldest sons, Frank W. and Thomas S. Henson, though he still takes an active interest in all that pertains to its welfare. The present proprietors have kept pace with the times, and have taken advantage of the many improvements in knitting machinery during the past few years. Hosiery and fancy knit goods manufactures have been almost revolutionized since they came into the possession of the mills, and they have not been behindhand in obtaining the best machinery adapted to their business. In busy times, about

125 hands are employed, men, women and children. Their goods find a market all over the country, and it is worthy of mention, in this connection, that their manufactures have been sold through but one commission house ever since the foundation of the business.

WILLIAM HENSON was born in Mansfield, Nottinghamshire, England, in 1815. He came to this country in 1839, and settled in Germantown, where he carried on the business of machinist. He was a most excellent mechanic, and was noted in his day for his thorough knowledge of the manufacture of knitting machinery for making hosiery. No one will deny that he was one of the pioneers of the Germantown hosiery and knit goods manufactures, and that he rendered valuable assistance in building up this industry to its present proportions. Many of his machines are still in existence, if not in operation. The demand for his machinery was not confined to Germantown, but extended to New England and the Canadas. As an evidence that his fame still survives, as late as 1874 he was in receipt of correspondence from Canada with reference to knitting machinery. He now lives in retirement in the house adjoining the one in which he first commenced business.

ERIE BLAST FURNACE, Rawle, Noble & Co., Erie. The present firm includes the following members: Henry Rawle, Orange Noble, Norman Hall, T. F. Noble and Charles Hall, of Erie; George B. Delameter, of Meadville, and John P. Brock, of Philadelphia, who commenced the enterprise in 1869. The establishment is located at the foot of Sassafras street, and occupies fifteen "water lots," on which are erected the various buildings where the operations are carried on. These consist of a furnace, having a stack 55 feet high, and the bosh is 9 feet in diameter. There is also a brick casting house, 40 by 102 feet; a stock house, 75 by 100 feet; an engine house, 40 by 75 feet, containing a blast engine built by the West Engine Company, of Norristown, Pennsylvania, and drives two hot blasts. There is also a hydraulic hoisting machine, for the purpose of elevating ores, coal, limestone, etc. The furnace went into blast in 1869, and was operated continuously until July, 1873. During this period semi-bituminous coal was used for smelting, and the average product was about 9000 tons of pig-iron annually. Subsequently, the furnace was remodelled and adapted to charcoal. Ten charcoal pits, measuring 50 by 16 feet each, have been added to the works, to supply the necessities of the furnace. The latter was blown in in September, 1874, and the present yield is at the rate of 6000 tons per annum. The ores used are from Lake Superior, and about 12,000 tons are required for the furnace; 5000 tons of limestone and 700,000 bushels of charcoal to convert the ores into the pig-metal. About thirty men are employed by the firm, and the business is under the management of Norman Hall.

ERIE CITY IRON WORKS, George Selden, President; John H. Bliss, Secretary; George D. Selden, Treasurer; Erie. The business was established about 1840, by W. & J. F. Liddell, as a foundry and machine shop, and in after years passed through several changes of proprietorship. In 1865, it was incorporated by the present owners. The works front on State street, and are bounded by French, State, Eleventh and Twelfth streets, occupying about three-fourths of the block, one-half of which is covered by the various buildings of the company, which are of brick and also frame. The average number of hands employed is 150. The articles manufactured are principally steam engines, ranging from 8 to 125 horse power. The company make a specialty of the "Erie City Engine," which has a wide reputation throughout the country. Their trade extends all over the United States; they have agents in all the principal cities, both East and West, and their custom is also growing in the Southern portions of the Union, which latter section promises to be the most important of all. The aggregate value of their manufactures amounts to about $200,000 per annum. The works have lately only been running about one-half their capacity, but are, nevertheless, in first-rate order.

GEORGE SELDEN, President, was born, 1827, in Erie, Pennsylvania, of American parentage, his father, George Selden, having been a resident and merchant in that city since 1820. He was educated there, and at the age of sixteen went to sea in a merchantman; his first voyage was to China, which occupied eighteen months, and his second was to Europe. On his return home he removed, in 1846, to Virginia, where he remained two years, and in January, 1849, went to California *via* the Isthmus, and from Panama in a sailing vessel. He was for four years in the mountains, mining and trading with the Indians, and was moderately

successful. He returned to Erie in December, 1852, and was engaged in various pursuits until September, 1864, when, in conjunction with others, he purchased the Erie City Iron Works. He resides on State street, Erie.

JOHN H. BLISS, Secretary, was born, October 4th, 1823, in Fort Howard, Wisconsin, and is probably the oldest white native citizen of that State now living. His father, Colonel John Bliss, of the United States Army, was a native of Haverhill, New Hampshire, and descended from old English stock, who came to America in 1640, and settled in Springfield, Massachusetts. He entered the army during the War of 1812 and rose to the rank of Lieutenant-Colonel, and resigned in 1836. His son, John H. Bliss, was educated in Cincinnati, Ohio, and at Cambridge, Massachusetts. He afterwards studied law in Buffalo, New York, and was admitted to the bar in 1846, and practised his profession for about three years. He then removed to Erie city and became associated with George Selden in the bending business, making felloes, carriage-falls, etc., in which he was engaged for two years. He then commenced the manufacture of oil barrels, at which he continued for three years. In 1863, they became associated with the firm of W. & J. F. Liddell, in the Erie City Iron Works, which became an incorporated company in 1865. He was married, 1850, to Ellen, daughter of Dr. P. Christie, of the United States Navy, and has a family of three children.

WILBRAHAM STEAM ENGINE WORKS, T. Wilbraham & Brothers, Proprietors, Philadelphia. These works were established about twenty years since, by the firm of Wilbraham & Whittington, at Frankford avenue and Amber street. From time to time they were enlarged, as business steadily increased, and were subsequently conducted by the firm of Wilbraham, Whittington & Pole, who were in turn succeeded by Thomas Wilbraham; and for the past ten years the latter has had associated with him his two brothers, James and John W., under the style of T. Wilbraham & Brothers. The works are now five times the size they were when the enterprise was first initiated, and the several buildings included in the establishment are erected on four separate lots, and were built at different times as the business required. There is a front on Frankford avenue of 206 feet, with an average depth of 60 feet, and they are arranged specially for facility in executing engine work. The pattern department occupies the two upper floors of a three story building, and is filled with an assortment of modern designs, prominent among which is that of the recently invented Baker Rotary Blower. On the corner of Amber and Fourth streets, and immediately opposite the machine shop, is the spacious boiler manufactory. The dimensions of this building are 100 by 150 feet. It is enclosed by a large yard, running from Firth to Cumberland street, and covering an area of more than half a block. At the intersection of Frankford avenue and Amber street is the foundry for castings, while opposite, and with a front of 60 feet on the avenue and running back 120 feet to Collins street, are the erecting shops and storage rooms for patterns, etc. The manufactures carried on, besides steam engines—which is their specialty, and of which they have constructed, to the year 1875, no less than 680 of various sizes—embrace boilers, force blast rotary pressure blowers, castings, etc. The Baker Rotary Pressure Blower is manufactured solely by this firm. Its purpose is to produce a blast for the melting of iron, with a view of performing more work with a less expenditure than any other heretofore used. To state the case precisely, this blower can, in only 80 revolutions and with half the power, melt fifty per cent. more iron than the fan blast can in 1600 revolutions; and what is a great desideratum, and in consequence of the greater heat caused by this blower, the iron is kept in a perfectly consistent state of fluidity, and the dreaded contingency of "dull iron" is avoided. One of the largest firms in Birmingham, England, recently ordered one of these machines, and they are to be found in all first-class establishments through the country. Of the superior quality of steam engines made by this firm, it is only necessary to remark that they have erected several for the Baldwin Locomotive Works, and have also supplied the prominent firms of William Sellers & Co., Morris, Tasker & Co., etc., of Philadelphia; the House of Correction, together with different railroad companies throughout the United States; they also built the engines which are in use at the International Railroad bridge at Buffalo, New York. The establishment gives steady employment to forty hands, which number is materially increased when there are heavy orders ahead. The cash value of products is about $130,000 per annum.

THOMAS WILBRAHAM, senior member of the firm, was born, 1826, in Clayeloy, Derbyshire, England, of English parents, and was educated

there. Coming to the United States at an early age, he was apprenticed to James Brooks, of the Bridgewater Iron Works, Frankford, Philadelphia, where he served his time. After this he became an engineer, first, on the Philadelphia & Reading Railroad; subsequently, on the Vicksburg & Jackson Railroad, in Mississippi, and on a line in the island of Cuba, whose terminus is in Havana. He afterwards went to California, and was one of the pioneers in the gold mines of that State. After remaining there for some time he removed to Nicaragua, and was engineer of the first steamer that ran on the waters of Lake Nicaragua, owned by Commodore Vanderbilt. After being so employed for four years, he returned to Philadelphia and embarked in his present enterprise.

KEYSTONE BRIDGE COMPANY, Pittsburgh and Philadelphia. This company was organized in 1865, with a capital of $300,000, absorbing the firm of Piper & Shiffler, who had erected bridge works in Pittsburgh, in 1863, and executed many important works. By a very liberal charter, granted by the Legislature of Pennsylvania, in 1872, the company was authorized to increase its capital stock to $1,500,000, and the privilege was conferred to construct general machine work and the substructure and superstructure of buildings, bridges, and other constructions of wood, iron, steel, stone, etc., in any part of the United States. After numerous additions to the original shops, the present new and complete works were erected on a lot embracing six acres of ground purchased for the purpose. The latter comprise machine shops, smith shops, riveting sheds, bolt-cutting and testing houses, pattern shops, a large iron building for a foundry, offices, stables, and all the accessories of a first-class business. In the completeness, extent and adaptation of all the tools and appointments required for heavy bridge construction, these works are unrivalled in this country, while, at the same time they possess every facility requisite to the construction of iron roofs, fire-proof buildings, turn-tables, roadway bridges, wooden bridges and general foundry and machine work. Their annual capacity is now about $3,000,000, and their facilities are being increased constantly, further extensions of the works being now in progress. The operations of this company have been supplemented and greatly aided by the firm of Carnegie, Kloman & Co., who erected large works closely adjacent to the shops of the Keystone Bridge Company; and by these means the demand for new forms of iron in improved bridge construction, embracing channels, beams, hollow columns and "upset" or weldless tension chords, was promptly met. This followed as a natural sequence of the law of demand and supply, by which one great industry invariably calls into existence other allied manufactures especially adapted to facilitate and enlarge its productions. The intimate relations existing between these companies, and the immediate proximity of their respective establishments, afford the opportunity of observing and directing the special manufacture of the iron employed in bridge and other work in all the varied manipulations, from the ore to the finished bar. The quality of the ore and the fuel employed, as well as the improved methods of heating and working the iron, are a guarantee that the quality furnished cannot be surpassed for bridge construction. The ability of this company to obtain on the spot all shapes of iron and any graduation in thickness and width of bars, rolled to unusual lengths, insures a prompt execution of all classes of bridge and other work contracted for. And by watching each step in the process of manufacture, and by carrying out a most careful system of tests, not only at the mills of Carnegie, Kloman & Co.—where the bars are piled, rolled and re-rolled, and in the smith shop, where every precaution is observed by skilled foremen to detect imperfections—but also at their own works, by constant tests of specimens cut from bars designed for bridges, the proprietors are enabled to determine whether the material, mixture and working of the iron are such as to render the quality satisfactory. When this is discovered to be below the requirements, the causes can be determined at once. The mixture and kind of ores are then varied, and such care observed in the manufacture as will produce results in conformity with the required specifications. This company have built iron bridges of every variety and in nearly every section of the country, besides an almost equally great number of wooden bridges. Out of the large number of iron bridges being built by them may be mentioned the bridge over the Ohio river, at Cincinnati, for the Cincinnati Southern Railroad, which has one span of 520 feet and two spans of 300 feet each, a pivot span 387 feet and fixed span 110 feet, the channel span of which is the longest span of iron truss bridge in the world; and the Pivot bridge at Raritan Bay, New Jersey, with a span of 472 feet. This latter is the longest swing bridge in the world. Their achievements, however, have culminated in the great bridge over the Mississippi river at St. Louis, the contract for

which was awarded to them. This immense bridge has three arches, two of which have spans of 515 feet each, the remaining one being 520 feet, these being the longest spans in the world. The steel was principally furnished for them by the Midvale Steel Works, Philadelphia. The machine work on the steel tubes, etc., required tools of large capacity and great accuracy. The satisfactory execution of the work does great credit to the ability and skill of the general manager and his corps of assistants in charge of the mechanical departments of the works. The erection was conducted under the immediate superintendence of Walter Katté, the Engineer of the Keystone Bridge Company. The designs for most of the erecting apparatus were submitted by him, and approved after certain modifications by the executive officers of the company. Great credit is also due to Captain J. B. Eads, and to Colonel Flad, who rendered much valuable assistance. The extensive plans required for the manufacture and erection of these great works, and the experience necessarily required in their execution, give to this company peculiar advantages in undertaking and carrying to successful completion any great works of substructure or superstructure

J. H. LINVILLE, the President of the Keystone Bridge Company, was for many years the engineer on the Pennsylvania Railroad, being specially engaged in the construction of bridges and buildings for the railroad and its dependencies. He has devoted his entire attention to iron bridge building for the last fifteen years. He was one of the originators of the Keystone Bridge Company, and has designed most of the long span bridges in America.

A. CARNEGIE, a successful railway manager, financier and iron manufacturer, was one of the founders of the company, and with his brother, T. M. Carnegie, Treasurer of the Keystone Bridge Company, has been very successful in producing iron specially adapted to bridge work.

SCHOFIELD & BRANSON, Manufacturers of Cotton and Woollen Hosiery, Philadelphia. This firm was established in 1858, by Benjamin Schofield and Thomas Branson, under the above name. Their first step was to purchase a property bounded by lines of 122 feet on American street, 122 feet on Jefferson street and 178 feet on Philip street. There were then but two buildings for manufacturing purposes on the ground; the brick building, since enlarged, on American street, and adjoining this a wooden structure, used as a saw mill. The firm began with a limited capital, running only two sets of woollen cards, two sets of knitting frames, and employing about twenty-four hands. Some of the yarn manufactured was sold, and the rest worked up into hosiery, properly so-called. Three years after their commencement, they enlarged their accommodations by putting up the building on Jefferson street, an event which took place just after the outbreak of the civil war, the partners deriving a legitimate advantage from the imperative military necessity for stockings, experienced by marching armies, and supplied by means of Government contracts. In 1863, it was found necessary to still further increase their manufacturing facilities, and the factory building on Philip street was erected. Few army contracts, however, were filled within its walls. Shoddy had begun to enter as an element into commercial success, and Schofield & Branson, finding themselves underbid by manufacturers who could afford to supply an inferior article, abandoned military operations and again turned the products of their factory into the channel of regular trade, which was then reviving. The premises now consist of four large brick buildings, all connected and forming the sides of a hollow square. On the property adjoining the works are two rows of dwellings, rented and occupied by the operatives in the factory. The main building is four stories high, the others three stories. On the first floor are the offices, the carding room and two sets of woollen machinery; on the second floor is a rotary stocking machine and two English knitting machines; while the third floor is devoted to the cotton spinning department. The mill now employs 300 operatives, besides nearly an equal number engaged without the walls in various processes of manufacture. The value of goods annually produced amounts to about $500,000.

BENJAMIN SCHOFIELD was born, April 21st, 1821, in Mosely, Lancashire, England. He was left fatherless when but five years old, and it immediately became necessary, child as he was, that he should contribute to his own support. A place was found for him in a woollen mill, where he continued until he had grown to man's estate, receiving a small and very slowly augmenting stipend, out of which, however, he had contrived to save, by the time he was twenty-six years old, enough to pay his passage to the United States, whither his ambition had ever prompted him to go

in search of a field of enterprise. He crossed the Atlantic and arrived in Philadelphia, where his first employment was helping to dig a cellar. It so happened that the cellar was being dug for a wool carder, who, discovering in his new hand a skilled artisan, engaged him in his establishment at $5 a week. This was W. L. Crook, who in a year's time enlarged his business and Benjamin Schofield's salary. The latter continued in the same factory until 1854; meanwhile, he had married and had laid by enough money to purchase 106 acres of land, and was about removing to it, to enter upon a farmer's life, when, very opportunely, he learned that his uncle was in business in Philadelphia and proposed to take him into partnership. To this he consented, and they together rented a room in Coleman's Bolt Factory, in Arch street near Twenty-first street, where they had the advantage of the necessary steam power. He put into the concern what capital he could command, and began a business which prospered until the financial crisis of 1857. At that time they were manufacturing from 200 to 300 pounds of yarn daily, and employing some eight or nine operatives. In December of the same disastrous year, his uncle died, and the affairs of the firm were entirely prostrated by the condition of the market. No failure, however, took place; the junior partner conducted the business for nearly a year after his uncle's death, and succeeded in paying off all debts before he entered into partnership, in 1858, with Thomas Branson.

THOMAS BRANSON was born, 1819, in Nottinghamshire, England. His father was a manufacturer of hosiery, and during his lifetime able to maintain and educate his children. He died, however, when Thomas was but eleven years old, and the boy was compelled to leave school and go to work to earn his livelihood. He went on a farm, where he remained until old enough to be apprenticed to a manufacturer of hosiery, residing about four miles from Nottingham. He began at the lowest round, and worked his way steadily upward until he became foreman of one of the shops. Just as prosperity seemed dawning upon him, a financial crisis in England so depressed trade that he became disheartened. He was then a married man, with a family. Believing that he could better his condition by emigrating to the United States, he left his wife and children—as he had not sufficient means to pay their passage, too—and sailed for New York. Landing there, he went to Philadelphia, where he found a compatriot and friend from whom he secured employment as a weaver and frame-work knitter, receiving from the first $10 per week, which, in those days, was regarded as good wages. This was in the spring of 1847. In the following October, he sent for his family, consisting of his wife and two sons. Soon after their arrival, he left his employer and took a situation in Magg's Mill, at St. John and Green streets, where he remained until the proprietor relinquished business, in 1851. The latter urged his employé to go into business on his own account, which he did; and with a little money which he had saved he bought a couple of machines and began the manufacture of stockings. He made only a good article, and found a steady and increasing demand for them, which soon enabled him to rent a store, where he carried on a retail business, employing eight hands to keep his shelves supplied with goods, and where he soon began a wholesale business, sending consignments for a long period to one merchant in New York who engaged to take all the goods that he could manufacture. In this enterprise he was greatly assisted by the business talent and energy of his estimable wife. The wholesale department at length became of so much importance as to enable him to dispense with the retail branch entirely, and to turn his attention to the manufacture of hosiery on an extended scale. He obtained the best machinery that could be found in America, and spared no expense in securing the best material and labor. His hosiery, consequently, soon acquired a reputation, and he found himself on the way to become a representative manufacturer of the State. He had been in the habit of purchasing yarn from Benjamin Schofield, and their acquaintance ripening into mutual confidence and esteem, they concluded, after the death of the latter's uncle and partner, to unite their interests.

PENNSYLVANIA SOAP WORKS, McKeone, Van Haagen & Co., Proprietors, Philadelphia. These works were established about 1854. They are located on Callowhill street, close by one of the entrances to Fairmount Park. They are of great extent and capacity, and are the largest soap works in the State of Pennsylvania—perhaps in the world. The buildings have a frontage of 250 feet on Callowhill street, and extend back about 200 feet. Beyond this the property reaches to the river Schuylkill, a distance of 313 feet, and includes a wharf with a river front of 300 feet. The productions of the house include both branches of soap manufacture—the making of family soap and

fancy soaps. These two branches are kept entirely distinct, being carried on in two separate buildings. The building devoted to the family soap department is 87 feet by 200, and five stories high; and that for the fancy soap department, 75 feet by 180, and three stories high, with all necessary outbuildings and sheds. The machinery is worked by an engine of 360 horse power, the number of hands employed is 250, the works and stock in trade represent a capital of over $600,000, and the business transactions of the firm amount to about $2,000,000 per annum. The progress of the house is seen by contrasting these figures with those of the year 1854. In that year they used forty-five horse power and had about $50,000 invested, employing only twenty-five hands. The various details of the operation of soap making, as carried on in this establishment, are reduced to a most perfect system, and constitute an industry of vast extent. The first step is the preparation of the soda-ash, of which 5,000,000 pounds are annually imported by the firm from England. When of proper strength, it is drawn off to a huge reservoir which supplies all the departments. The next stage is the mixing of the tallow grease and other ingredients, which is done in ten large iron pans. In years past the pans used for this purpose were very small, a pan of the capacity of 20,000 pounds being considered very large; but there are now in use here two pans of the capacity of 300,000 pounds each. The cold process, as it was called, has been abandoned, and all soap now made is thoroughly boiled. After a few days in the pans, the soap is next removed by pumps to the "crutching or mixing room," where variegated forms, such as Castile and other soaps, are finished, and thence to the "framing rooms," three in number and each 87 by 93 feet. Here it is emptied into large iron "frames," or boxes of about 1500 pounds capacity each, and allowed to harden and cool. In these three rooms are always to be found from two and a-half million to three million pounds of soaps undergoing process. It is now ready for handling. The 1500-pound blocks are cut up into small bars, blocks or cakes, to suit the trade, and then carried by elevators—of which there are two—to the upper floors, to be boxed and labelled. In the family department the firm have successfully inaugurated the making of real Castile soap. They import direct the olive oil from which it is made. This was done because of the adulteration by the French of the imported soaps, which which were found by analysis to contain 22 per cent. of earth to make up bulk and weight. They have in use automatic presses, which press, form and stamp forty cakes per minute. In the fancy soap department the process is nearly the same as for family soaps, two huge pans being used. It is first "framed," or converted into huge cakes, about the size of an ordinary travelling trunk, having been first colored by vegetable ingredients in yellow, red, purple, scarlet, or mottled colors, and scented by the addition of various perfumes, such as otto of rose, musk, sandal wood, bergamot, lemon, orange, citron, lavender, cassia, rosemary, etc., etc. It is then cut by machinery into the proper shapes, and passes through a drying process, the cakes being deposited on racks which contain millions. After being dried, it passes through heavy presses, to give the cakes solidity and uniform strength, and is stamped. It then goes to the packing department, where it is handled by female operatives, the medium grades being packed in plain paper boxes and the better grades wrapped in tissue paper, each cake separately, and then packed, some in neat and some in highly ornamented boxes, for toilet use. The firm make no less than 161 distinct kinds and styles of soap for fancy purposes. The quantities of materials used by this house are enormous. Besides the soda-ash, already mentioned, they consume 50,000 bushels of lime and about 15,000,000 to 20,000,000 pounds of fatty matter, large quantities of olive oil and a great quantity of miscellaneous ingredients, such as perfumes, etc., to the value of about $40,000 per annum. The capacity of the works in the aggregate is about two and a-half million pounds of soap per month, or thirty million pounds per year.

ERIE ROLLING MILL, Henry Rawle, President; William Varnum, Vice-President; Lloyd G. Reed, Treasurer; Erie. The company owning these works was duly incorporated under the manufacturing laws of the Commonwealth, and commenced operations in 1872 with a capital stock of $300,000. There are thirty acres of ground occupied by the establishment, which is situated outside the city limits on the west. The mill is L-shaped, and is in dimensions 255 by 140 feet. In addition to this, there are machine and blacksmith shops, pump house, and twenty tenements for the occupancy of employés, who number 125 hands. A portion of the machinery was purchased from the works of Coleman, Rahm & Co., of Pittsburgh, of which firm the Vice-President of the company was formerly a partner; and the balance was built in Erie. The rolling mill contains eleven puddling and five heating furnaces, and four trains of rolls

operated by six steam engines; there are also one set of double and another set of single shears, and roll-turning machinery. The articles manufactured include merchant bar, car-iron and horse-shoes. During the first year, the production was about 5000 tons; but the capacity of the works has since been greatly increased. In addition to the officers of the company above named, the following gentlemen are associated with them as directors: William L. Scott and Dr. C. Brandes.

PERSEVERANCE DYE WORKS, Cuttle Brothers, Germantown road and Lehigh avenue, Philadelphia. This growing industry was founded by William Derbyshire, a native of England, who carried it on for about a quarter of a century. He was rather eccentric in the conduct of his business, and his wagons were recognized on all occasions by the English donkeys that drew them. These small animals were dyed in various colors, and presented a novel appearance. The dye-house was located on Girard avenue, near Front street. The business in his hands was never very extensive, but was widely known from the feature mentioned above. He was an excellent silk dyer, however, and had a fair trade. In 1873, George S. and Matthew C. Cuttle purchased his good-will and fixtures, with the purpose of extending the business, and including the dyeing of raw wool, cotton, woollen yarn, cloths, etc., etc., as well as silks. Finding the place too small for the object they had in view, they purchased a lot at Germantown road and Lehigh avenue for $10,000, and immediately commenced the erection of a commodious dye-house. They had in the meantime completely revolutionized the business carried on by the founder, and had increased it to four times its old proportions. It also includes special features found in but one other establishment of the kind in the city. The firm have facilities for doing $100,000 worth of business annually, and expect to even exceed that amount in the not very distant future. They are young men of enterprise, experienced in their business and are continually adding to the capacity of their works. They have had the foresight to purchase an extensive lot in a rapidly improving section of the city, so that no probable increase in their business will crowd them for room.

GEORGE S. CUTTLE was born in Rastrick, Yorkshire, England, in 1846. He learned the trade of dyer with his father, a man skilled in the business and who is now in charge of one of the most extensive carpet manufactories in England, that of Mitchell Brothers. He came to the United States in 1869, and up to the time of going into business for himself had charge of the dyeing department of McCallum, Crease & Sloan's Glen Echo Carpet Mills, at Germantown.

MATTHEW C. CUTTLE, the junior partner, is also a native of England. He learned the trade of dyer with his father. He came hither in 1870, but returned to England shortly after. He is an expert in making colors for tapestry, etc., etc. While engaged with Mitchell Brothers, he made the only square of printed carpet that was awarded a prize at the Vienna Exposition. He returned to this country in 1873, and went into business with his brother.

TIBBALS, SHIRK & WHITEHEAD, Manufacturers and Wholesale Dealers in Stoves, Hollow-ware, etc., Erie. The business was first established, in 1840, by Johnson & Himrod, who made one stove per day. They were succeeded by Vincent, Himrod & Co., which in turn gave way to Vincent, Tibbals, Shirk & Co., who continued the manufactory until 1863, when the present firm, consisting of C. M. Tibbals, C. M. Tibbals, Jr., C. C. Shirk and W. H. Whitehead, acquired possession of the works, which they have operated and increased to their present capacity, so that they have become the largest and most successful establishment of their kind in western Pennsylvania. The location is on the corner of Twelfth and Sassafras streets; the main building, comprising foundry, mounting shop and wareroom, measures 312 by 105 feet; a small warehouse, 50 by 100 feet; both these are wooden buildings, and each two stories in height. The pattern and coal house is of brick, two stories high, and is of the dimensions of 20 by 200 feet. There are 100 men constantly employed by the firm, who manufacture 15,000 stoves yearly, which yield the sum of $275,000. The works are under the management of C. C. Shirk.

C. M. TIBBALS, SR., was born, 1811, at Pompey Hill, Madison county, New York, where he was educated. He removed to Pennsylvania about 1830, and was engaged in the dry goods business in Erie until 1860, when he disposed of his interests in that line and became the senior member of the present firm. He was married in 1835, and has a family of three children.

C. C. SHIRK, a partner in the firm and manager of the works, was born, September, 1841, in Waterford, Erie county, Pennsylvania. His father, David Shirk, removed to Erie in 1842, and soon after entered the firm of Vincent, Himrod & Co., in which he continued for many years; he died in 1873. His son, C. C. Shirk, entered the employ of the firm in 1860, and in 1866 became a partner. During the War of the Rebellion, he entered, 1862, the United States Navy, and served about one year, being first on board one of the vessels of the Tennessee Squadron, of which his brother, James W. Shirk, was commander; afterwards he was attached to the Mississippi Squadron. He is at present a director of the Dime Savings Bank, of Erie, is married and resides in Erie.

J. F. ADAMS & CO., Washing Machine Manufacturers, Erie. This extensive establishment was commenced, in 1869, by Adams & Lovell, by whom it was conducted about one year, and then the junior member retired. The business was carried on by the remaining partner until 1874, when A. H. Gray purchased an interest in the works, and the firm adopted its present style. The works are located on the corner of Fifteenth and Cherry streets, and occupy a lot 135 by 330 feet, or a little over an acre of surface, on which is erected the manufactory, which is of brick, 135 feet front on Cherry street, with a depth of 100 feet on Fifteenth street. The principal washing machines made are the "Complete Washer," the "American Washer" and the "Walker & Lovell Machines." About 20,000 of the first-named variety are manufactured annually, and an equal number of the others combined. The firm also make 15,000 step-ladders and 3000 extension-ladders yearly, and have recently commenced the manufacture of the "Walker Folding Lever Wringer." The machinery consists of a thirty-five horse power steam engine, supplied by a sixty horse boiler, which drives a full line of the latest improved labor-saving wood-working machinery. The fuel is obtained from a gas well on the premises, at a but nominal cost. The establishment employs a force of from twenty-five to forty hands, and the articles manufactured are worth in the aggregate about $100,000 per annum. The success of the firm has been so great that they propose to increase their business to double their present capacity during 1875, which will render it one of the most extensive manufactories of this description in the country; and as the city possesses unsurpassed facilities for manufacturing purposes, the firm will doubtless soon occupy a front rank in this branch of industry.

L. W. OLDS, Manufacturer of Pumps and Wooden Pipes, Erie. This is one of the oldest factories in the city, having been founded by the present proprietor in 1845. The works are located on Twelfth street, between Peach and Sassafras streets, and the lot is 100 by 165 feet in dimensions, on part of which is erected the factory, a two-storied brick building, measuring 45 by 55 feet, which contains the most approved pump-making machinery. The articles manufactured are pumps and water pipes, the material used being exclusively cucumber wood, of which some 250,000 feet are annually consumed. The superior qualities possessed by this wood—being perfectly tasteless and not liable to crack in the sun—render it especially adapted to this branch of manufacture. The sales extend throughout the Eastern and Western States. The factory is conducted under the personal supervision of the proprietor, whose long experience in the business has resulted in the superior workmanship of the goods, which has brought the complete success that has attended it during so many years. In 1869, the entire establishment was destroyed by fire, involving a heavy loss. It was, however, rebuilt at once, and the owner is fast recuperating from the effects of that disaster.

L. W. OLDS was born, 1822, in Erie, Pennsylvania, of American parentage. His father, Asa G. Olds, and his mother (who are both still living and are over eighty years of age) were among the first settlers in the county. His maternal grandfather, John Church, was a soldier in the Revolutionary War and was a lineal descendant of Captain Church, of Connecticut, who was in command at the battle in which the famous Indian chieftain, King Philip, was captured. L. W. Olds received the rudiments of an English education at home, closing with an academical course in Erie. He subsequently taught school for several years, and finally, in 1845, engaged in his present business, and was the first individual to introduce wooden pumps as an article of commerce. He has been, notwithstanding the disaster of 1869, generally successful in business, and owns considerable property in different parts of the city, including one of the finest brick blocks on State street. He served for three years as a member of the Board of Directors

of the Poor, during which time he had the supervision of the erection of the Erie Almshouse, one of the finest structures of the kind in the State. He was also, for ten years, a member and President of the School Board, during which period a majority of the present elegant school edifices were built. He is a business man of indomitable energy, perseverance and enterprise; and a gentleman of superior literary and scholastic attainments. He has travelled extensively through the United States and Canada, and has twice visited Europe and passed a considerable period in various portions of Great Britain. He was married, in 1848, to Louisa Ackerly, of Erie county, and has a family of seven children, one of whom, a son, after graduating at the Michigan University, was engaged for some time as an engineer in the Lake Survey, and has recently graduated from the University of Leipsic, Prussia.

STEARNS MANUFACTURING COMPANY, E. H. Stearns, President; D. B. Callender, Secretary; Joseph McCartee, Treasurer; Erie. The original location of the business carried on by this company was in Cincinnati, Ohio, where it was established, in 1855, by E. H. Stearns, and by him removed, in 1868, to Erie, where he continued the works successfully, and the company was incorporated in 1873. The works are located on East Ninth street, and occupy an entire square of ground. The buildings are very substantially built, of brick, and employ, when working to their full capacity, 400 men. The manufactures embrace circular, gang and muley saw mills. The specialty is "Stearns' Improved Patent Portable Circular Saw Mill." The firm also manufacture engines and mill machinery generally. Their principal markets are in the northwestern States and the Dominion of Canada. For the year preceding the financial panic of 1873, their sales amounted to over $1,000,000.

E. H. STEARNS, the President, from whom the company is named, was born, December 16th, 1814, in West Cambridge, Massachusetts, where his father, Abner Stearns, was well known as an inventor and manufacturer. He was educated in Andover, Massachusetts; and, having finished his studies, became a constructor of saw mills. He subsequently carried on the planing business in Covington, Kentucky, and afterwards became a member of the firm of Lee, Leavitt & Stearns, saw mill builders, Cincinnati, Ohio. In 1855, he established the present business, and has since devoted his time to the improvement and perfecting of saw mill machinery, and has received at least fifteen letters patent for the same. He stands at the head of saw mill builders in the United States, and has established the largest business of the kind in Pennsylvania. He was married in 1837, and resides at 117 West Ninth street, Erie.

MOSHANNON LAND AND LUMBER COMPANY, H. H. Shillingford, President; James T. Shillingford, Secretary and Treasurer; John Lawshe, General Superintendent; Osceola Mills, Clearfield county. This company was incorporated in May, 1867, with a capital of $500,000, divided into 25,000 shares of the par value of $20 each. Five years previously, the first gang saw mill had been erected and operated in the timber region of Clearfield county by Lawshe, White & Co. This firm was succeeded, in 1867, by the present company, which owns 9000 acres of timber land in Centre and Clearfield counties, underlaid with coal. The operations are conducted at Osceola, Clearfield county, on the Tyrone & Clearfield Railroad, about nineteen miles north from Tyrone, and at an elevation of 1000 feet above tide-water. The timber is mostly pine and hemlock, which is cut by the company's hands, hauled and floated to the mill, a distance of between four and ten miles. The receiving pond has a capacity for storing 12,000,000 feet, board measure. The mill is situated on Moshannon creek; the original mill was burned down in 1871, but it has been replaced with another, believed to be the best appointed in the country. It is 100 feet square, built of stone, of a single story, and contains the following line of machinery: three muley saws, one flat gang of thirty saws, one flat gang of twenty pony saws, one double-edger, one gang-edger of five saws, two shingle machines and one lath and picket mill. These are propelled by a steam engine of 125 horse power, supplied by steam from six cylinder boilers, 3 feet in diameter and 36 feet long. The boilers and engine are in a separate building, 60 feet square and built of frame. The capacity of the mill averages 75,000 feet, board measure, 25,000 shingles and 25,000 plastering laths per day. Besides the main mill, the company has what is termed a "Bill Mill," driven by a forty horse power engine, with a capacity of 15,000 feet per day, and is used chiefly to cut bills of lumber to order. There is

quite a business done in this line, and the company holds itself in readiness to saw to order any bills of lumber in pine, hemlock or oak, promptly and in a satisfactory manner. In addition to the property mentioned above, there are the most improved facilities for handling the lumber when manufactured, with railroad connections, giving abundant transportation conveniences. The company has built about a mile of trestle work and mill track, and nearly as much railroad siding, giving every opportunity for doing the work economically. The produce is shipped to Tyrone, via the Tyrone & Clearfield Railroad, thence by the Pennsylvania Railroad both east and west to market. The company still has uncut a large amount of timber, estimated at 200,000,000 feet. It is also the proprietor of the town of Osceola, which now (1875) numbers about 1500 inhabitants. The present General Superintendent, John Lawshe, has been the manager of the business since its inception. The company has an office at Forest place, 125 South Fourth street, Philadelphia.

ATLANTIC KNITTING MILLS, Fleming Brothers, Proprietors, Philadelphia. In 1867, a co-partnership was formed between George M. Fleming and James Hogg, under the firm-name of Fleming & Hogg, to carry on the business of manufacturers of hosiery and fancy knit goods. The firm commenced business in a small stone building on Mill street, Germantown. They employed forty or fifty hands, and may be said to have started very prosperously. Their factory was built and owned by themselves. In the following year, William H. Fleming, a brother of George M., was admitted into the firm. In the fall of 1869, the firm closed their factory on Mill street and commenced the erection of their present handsome buildings, at Eighth and Dauphin streets. In the spring of 1870, they occupied this property and commenced to push their business with renewed energy. On or about this time James Hogg sold his interest in the concern to his two partners, and the firm became Fleming Brothers. The property fronts on Eighth, Ninth and Dauphin streets, directly opposite the Fourth and Eighth Streets Passenger Railway Depot. It has a front of 228 feet on Dauphin, 130 feet on Ninth and 80 feet on Eighth streets. Their manufactures include hosiery and many descriptions of fancy knit goods. They employ about 200 hands, and at times run night and day, employing of course a double set of hands. Considering the few years they have been engaged in the business, their success has been very flattering. They are young men of enterprise, backed up with business sagacity and experience. They superintend their own manufactures.

WILLIAM H. FLEMING was born in Philadelphia, in 1844. Before entering his present business, he had been engaged in other pursuits calculated to give him a thorough knowledge of manufactures. He possesses all the cool calculation found in much older men, and no doubt his success in business has been brought about by his keen foresight. He devotes all his attention to his manufactory.

GEORGE M. FLEMING was born in Philadelphia, in 1845. He occupied various positions before engaging in his present business, but not as a manufacturer. Like his brother, he devotes all his time to his business.

JAMES HOGG was for many years in the counting-room of Charles Spencer, at Germantown. After withdrawing from the firm he entered the employ of Fleming Brothers, where he still remains.

JACOB BERGES & CO.'S DYE WORKS, Amber street, above Norris, Philadelphia. These works were founded by Jacob Berges, in 1849, and were then located on Apple street, above Thompson. His capital was very small, but his knowledge of the business carried him safely through all difficulties. At this establishment only fancy yarns, such as are used by hosiers or manufacturers of military goods, are dyed. In their special line they do the largest business in the city, and have a high reputation for the excellence of their work. The present works were erected in 1859, and front on Amber, Berges and Emma streets, the frontage being 120, 140 and 135 feet on each respectively. They comprise a very handsome group of buildings, with a residence attached. The partner in the concern is Charles Herbst, a relative of the founder. The works have a general look of prosperity about them, and strict regard for cleanliness is maintained.

JACOB BERGES was born in Prussia, in 1819. He learned the trade of dyer, and was employed in many first-class establishments in his native

country. Coming to the United States in 1848, he was employed as foreman of the dyeing department of William H. Horstmann's manufactory. Here he remained until he started in business for himself. His success has been achieved by hard work, and he belongs to that class of thrifty Germans who have done so much to build up the country. He takes a lively interest in the welfare of his fellow-countrymen, and is identified more or less with all that is undertaken in their behalf, including the German Society and the German Hospital.

G. S. FARSON & CO., Manufacturers of Refrigerators and Housekeepers' Woodenware, Philadelphia. E. S. Farson, the originator and now senior partner of this firm, commenced the manufacture of refrigerators on Third street, below Market, in March, 1848. For ten years previous to that time refrigerators had been made by several parties, but only on a small scale; and he was one of the first to make them a special manufacture, though for two years he disposed of his goods only at retail. But in February, 1850, finding a growing demand, he removed to the building which forms part of his present premises, 220 Dock street. Here he employed some five and twenty hands; and during the first year turned out about 500 refrigerators. He then, in view of organizing a wholesale trade, travelled through the principal cities, south as far as Charleston; and this had the effect of increasing his business to such an extent that, in 1854, he judged it advisable to take into partnership his foreman, Henry H. Brown. In 1862, it became necessary to increase his premises; and therefore an additional manufactory was opened on Levant street, and in 1868 the number of refrigerators produced had amounted to an average of 4000 per annum, at which figure it has continued. In 1870, a third partner was added to the firm, Joseph M. Brown, who had succeeded his brother as foreman; and in the fall of the following year the premises were still further increased by the addition of the building No. 209 Pear street. There are now over seventy-five hands employed; and the refrigerators, which form the staple article manufactured, are sent to every State in the Union, but have the greatest demand in and between Maine and Georgia. They are also exported to Canada, the West Indies and South America. The latest improvement is the Walnut Dining-room Refrigerator, which has a porcelain-lined ice-tank, thus affording a constant supply of pure ice water, quite free from metallic contamination. E. S. Farson & Co. received a bronze medal for refrigerators at the Franklin Institute Exhibition of 1874. The Porcelain-lined Water-cooler, the Ant-proof Provision Safe and the Folding Settee Ironing-table are the principal among many other articles which the firm have from time to time invented and continue to manufacture. The great success of this establishment is attributed to the economy which is exercised in every department, the practical knowledge possessed by each member of the firm and the high class of goods which are manufactured, the house desiring to have only the best trade.

ENOCH S. FARSON is of Scotch descent, and was born, May 23d, 1813, in the State of Delaware. He went to reside in Philadelphia in 1840, and has lived in that city and its neighborhood till the present time. In 1851, he was elected a school director of the First Ward, and served nearly two terms. He married in 1842, and has seven children.

ECONOMY SHOVEL WORKS, Myers & Armour, Beaver Falls. The original location of these works was at Allegheny City, where operations were commenced, in 1868, by the present firm, who removed the machinery during the following year to their present site. The works occupy two acres of ground, bounded by Harmony, Economy and Lincoln streets and the river banks. The main building is of wood, and is 100 by 65 feet in dimensions, with two wings measuring 30 by 85 feet. The machinery consists of two large till-hammers, two drop-presses, two trimming machines, three large grindstones, five emery wheels, strap rolls, cleaning machine, boring machine, etc., which are operated by a steam engine of forty horse power. These are employed to manufacture shovels, spades, grain-scoops, etc., of which from nine to ten thousand are made yearly. A force of thirty men and boys is employed. The firm make a specialty of manufacturing the celebrated "Moore three-rivet mining-shovel," chiefly for the California trade; it is considered far superior to the "Ames" shovel. The works have been in constant operation from their commencement, and the enterprise has proved a most successful one. The works have none but the highest grade of approved machinery and appliances, and the firm claim to have the same facilities as those enjoyed by any similar establishment in the country.

HENRY MILTON MYERS, the senior member of the firm, was born, June 17th, 1831, in Georgetown, Columbiana county, Ohio. His father removed to Jamestown, Pennsylvania, in 1835, where he remained until the autumn of 1844, carrying on the blacksmith business, and also manufacturing axes. His son Henry learned his father's trade, and when he had partly acquired it went to Cohoes, New York, where he perfected himself in the same at the axe factory of D. Simms & Co. He returned to Pennsylvania, and was first employed as a journeyman in the axe factory of Lippincott & Co., of Pittsburgh, where he remained eight years; and was next engaged by Newmyer, Graff & Co., of Allegheny City, to manage their works, and served their interests for twelve years. He removed thence to Beaver Falls, and established the present works, of which he is manager, as well as part owner.

SHIRLEY & THORNTON, Manufacturers of Ladies' and Children's Shoes, 722 and 724 Market street, Philadelphia. This house, although occupying a representative prominent position, is yet young, having been first established, in 1863, by the senior partner, who commenced at that date the manufacturing of ladies' and children's shoes for the trade. From the outset he was successful. In 1864, he associated with him Edward DesChamps, and subsequently Linford Delaney, under the firm-name of Shirley, DesChamps & Co. The business continued flourishing, though it remained within ordinary limits until 1867, when Charles F. Koons purchased the interests of the junior partners, and the firm became known to the community as Shirley & Koons. The new partner enjoyed the advantage of capital, and the combination of that essential with his own energy, and the practical knowledge of the trade possessed by the senior partner, caused the house to rise rapidly, and to attain in three years' time the rank which it holds to-day. Charles F. Koons died in the spring of 1873, and Joseph D. Thornton, a noted builder, and James H. Harper became associated with the founder. This partnership continued for one year, when James H. Harper withdrew, and the firm assumed its present title of Shirley & Thornton. The shrewd business qualifications of the latter gave the manufactures of the house a still more extended demand. Even during the widespread depression of 1874, the sales were increased; and during the first three months of 1875, the sales amounted to $30,000 more than those of the same period of the former year. Their annual manufactures are valued at over $500,000, and if the success of the past still attends the house, this will be increased to $1,000,000 at no distant day. Five hundred hands are employed, all but about fifty of whom are in the manufactory on Market street, and the balance do the work at their homes, etc. Of the employés, 300 are males and 200 females. But very few children are employed.

JOHN SHIRLEY was born, 1827, in Belfast, Ireland. He was brought to this country by his parents when but two years old, and was educated in Philadelphia. While a youth he became an apprentice to his father, and learned the business of shoemaking. After attaining his majority, he began, on his own account, the retail trade, and in this, his first venture, was successful, and soon had work enough to give steady employment to twenty-five journeymen. He had now married, and as a family were growing around him, he desired to provide for them even better than he had so far accomplished, and turned his attention to the wholesale business, as being more remunerative than the one he was following. For over eight years he had steadily labored, not losing over three days in all that time from any cause. Being thoroughly conversant with all the minutiæ of the retail trade, he hesitated some time before he ventured upon the wholesale business; but finally, in 1863, began, as already narrated, and attained the success he deserved so well.

CHARLES F. KOONS was born about 1845. He commenced life by entering, at the age of twenty, one of the largest dry goods houses in the country in the capacity of a salesman. He speedily commended himself to the notice of his employers, and many offers were made him to enter into business, but he declined them all. Having made the acquaintance of John Shirley, after a due examination of the concern as carried on by him, he concluded he had found the proper opening for engaging in business, which he did, as previously stated. He died April 1st, 1873.

JOSEPH D. THORNTON was born in Frankford, Pennsylvania, December 21st, 1828. His parents came from England to the United States a short time previous to his birth, and settled in Frankford. After receiving a limited education, he worked upon a farm from his tenth to his sixteenth year, receiving two months schooling each winter, and then became an apprentice to the carpenter's trade, with George W. Search, of Frank-

ford. Having finished his trade and attained his majority, in 1849, he removed to Philadelphia, where he took small contracts, and so continued in business until 1861, having in the meantime—on January 13th, 1851—married Anna E. Ensor, of Philadelphia. In 1861, he resolved to engage in business on a large scale, and began to erect houses for himself. Struggling against all discouragements, he persevered until his ability and energy won for him the implicit confidence of the community. From 1863 to 1870, he was intimately associated in business with the late Amos Ellis, and within ten years he erected about 1000 dwelling houses in the northern part of the city. He has made his own fortune, and well deserves the success he has won. Blocks of handsome edifices stand as testimonials of his skill, progress, energy, and great business capacity. In 1873, he entered into a partnership with John Shirley, as above stated, where his energy and enterprise are achieving great results.

ATLANTIC WORKS, Richards, Loudon & Kelley, Proprietors, Philadelphia. This business was founded in 1869, for the manufacture of machines especially directed to railway car and ship-building, predicated upon a supposition that the time had come when the American market demanded and was ready for a class of wood "cutting machines" of greater strength and capacity, and fitted in a manner corresponding to those for working metal. There had been to this time but one class of wood machines, arranged especially for cabinet work and joinery, yet applied to all purposes, including heavy work; while in England and elsewhere wood-working machines were in most cases adapted to the special requirements of the work to which they were to be applied; machines for working framing being much stronger and differently constructed from those intended for the lighter kinds of work. Designs were prepared without any reference to the precedents furnished by other builders. The proportions and fitting were based upon the functions of the machines alone; the framing, gearing, shafts, bolts, belts, and other details were adapted to the strains, and the conditions of their operation, so far as a long experience could determine. All "ingenious" complications were avoided; no small screws, springs, or other details known as "traps" were used. Screws were all turned; the heads and threads made to conform to a regular system. Bored and turned fits were made to standard sizes, and wearing surfaces "scraped" to a perfect bearing. Spindles were made of steel, with bearings of brass. Wheels and pulleys were fastened with steel keys instead of set-screws. Details that were subject to wear were case-hardened instead of polished. The usual expense of ornamental painting and waste of iron by architectural designs for framing were saved and applied in a better and more careful fitting of the working parts. These are in substance the principles upon which the works were founded; and the success that has attended the business and the machines during the five years past has proved that the merits of good fitting and careful designs and proportions are fully appreciated by those who have purchased them. The machines were more or less brought out in classes, and special for their purpose; each class and machine receiving all the attention and experience to be commanded in the special art. Thus band saw machines of every size and style for every purpose were produced; also machines peculiarly adapted for ship-building, joinery, car building, pattern making, etc., etc., and many different machines for particular purposes. The first products of the firm were band saw machines for scroll work, and for a short time they were in a manner a specialty; and while their sale constantly increased, as a specialty they diminished in comparison with the long list of heavy railway car manufacturing tools that soon crowded the works to overflowing. To meet this increasing demand for the various machines the capacity of the establishment was gradually increased by the introduction of the best iron tools that could be procured, some of which were special, and hence the peculiar facility the firm have in competing successfully, not only with rivals in the home markets, but also with those abroad. Notwithstanding the long list of machines made by this firm, the band saw received considerable attention. Expensive patterns were destroyed to be replaced by others wherein improvements could be made, and machines of various and many sizes were produced suitable for the finest scroll work—re-sawing and log sawing. The railway tools are of a heavy character, and in many respects peculiar in their adaptation; that is, they are particularly and conveniently arranged for car work, and have a much greater capacity than machines before used. With such machinery car manufacturers could make their coaches at a much less cost, and it was fast becoming proverbial that without such machines the cars could not be produced at a profit. The panic of 1873 of course lessened the demand for this class of machinery; but the inclination has been to buy the best when machines were

needed, and consequently there has been more or less demand for these machines right along. The greater part of the trade during the past several months has been foreign, for which markets the machines are well adapted because of their greater strength and durability. In fact, the firm have been so much encouraged in this foreign trade that they have felt justified in establishing an office in London, England, where much of the trade of the world is controlled; and also warerooms at Göteborg, Sweden, where many of the machines are sold. Some special machines have been produced for this trade, many of which would be very desirable in the home shops, such as the blacksmith lathe, repair lathe, etc., and fixed-knife flooring machines that feed eighty feet a minute. The shops of the Atlantic Works—situate on Twenty-second street above Arch—are not large, but they have the credit of producing a heavy amount of machinery every year.

GERMANTOWN BREWERY, John C. Miller, Proprietor, Germantown, Philadelphia. In 1865, Frederick Jacoby, John C. Miller, and Joseph Teufel formed a co-partnership for the purpose of carrying on the business of brewers of ale and porter. The style of the firm was Jacoby, Miller & Co. A small brew house was erected on Ashmead street, and operations were commenced on a small scale. In 1867, Frederick Jacoby withdrew, and the firm became Miller & Teufel. Both partners were experienced in the business, and the latter especially was a noted brewer. Very few hands were employed, and of the two teams engaged in the delivery, one was driven by John C. Miller. They started out with the determination to succeed, and were twice compelled to enlarge their brew house. Four hundred barrels of ale and porter were brewed the first year. Joseph Teufel died in February, 1872, and John C. Miller bought his interest from his heirs, and became the sole proprietor of the brewery. He industriously set to work to keep up the reputation of the business, and his success, considering the short time he has had sole charge of it, has been most remarkable. There are many larger establishments in the State than this, but none that have made such rapid strides in the first ten years of their existence. The products now average 18,000 barrels of ale and porter annually, and the brew of 1873 reached 20,000. The sales average about $150,000 annually. Since the death of Joseph Teufel the present proprietor has been compelled to again enlarge. The brew house now takes in the corner of Ashmead and Wakefield streets, with a front of 125 feet on the former, and a depth of 57 feet. About twenty hands are employed, and seven teams are engaged in delivering the products. The sales are principally confined to Philadelphia and its suburbs, although agencies are established at Trenton, New Jersey, Norristown, Pennsylvania, and in the State of Delaware, which meet with fair success.

JOHN C. MILLER was born in Wurtemberg, Germany, in 1828. He came to this country in 1849. Having been brought up to a life of industry, he soon found employment here, and worked hard at whatever he undertook. He met with many reverses, but finally succeeded in establishing a successful business. The plan of his brewery was originated by himself, and is pronounced to be a model of its kind. His success in his present business, considering the few years he has been engaged in it, has been remarkable. He devotes his entire attention to it, and has been the master spirit of the concern ever since its foundation.

NORTH AMERICAN LIGHTNING ROD MANUFACTORY, Reyburn, Hunter & Co., Philadelphia. This is the largest establishment of the kind, not only in the United States, but on either continent. It dates from 1849, and has been in successful operation ever since. The factory is located at the southwest corner of St. John and Buttonwood streets, and occupies a space of 125 by 100 feet. Almost all the work is done by machinery driven by steam power, and there are about 100 operatives employed in all branches of the manufacture. Several kinds of rods and cables are made, all of them being covered by patents. Of the lightning rods proper there are the grooved iron rod, galvanized or covered with a coating of zinc; the galvanized centre, covered with copper, of which 1,500,000 feet are yearly manufactured; and the solid star copper rod. Of the cable rods, there are Cushman's patent cable, consisting of four iron and four copper wires combined; a cable of four iron wires covered with a single sheet of copper; Cushman's solid copper cable, consisting of eight copper wires; and a cable of six iron wires around a copper wire. The rods made entirely of copper, or covered with it, are the best; that metal having seven times the conducting power of iron. The rods are bought already rolled, so that a cross sec-

tion of a rod would represent a star of four points. The ends are cut by machinery, and a screw thread cut on them, and they are then put into a simple machine, attended by two boys, and are there given the spiral twist, which stiffens the rod. Having been galvanized they are ready for sale. In the manufacture of copper-covered rods, the iron rod is galvanized before being twisted, and is run through a machine, to which is also fed a strip of sheet copper a few inches in width. The copper is wrapped closely around the rod, following all its indentations, and the covered rod having been then twisted, the copper covering is thereby securely fastened to the rod. In the machine for making cables, the different wires are wound upon large bobbins, which revolve around their own axes, and together revolve around a common axis, thus twisting the wires as they pass through the machine that closes them into the cable. Another curious machine is one by which the cable—consisting of four iron wires covered with a single sheet of copper—is made. Such cables were formerly made by covering separately four wires, and then twisting the covered wires into a cable. By the machine now in use, however, the four wires are covered at one operation by a single sheet of copper, the edges of which are turned in between the wires, which are, by the same operation, twisted into the cable form. One of the most surprising features of the manufactory is the rapidity and certainty with which the machinery does its work, almost without direction. In less than five minutes a rod could be passed through the various machines, and transformed from a plain rod of magnetic iron to a galvanized rod, spirally twisted, and completely covered with sheet copper. No rod is passed continuously through the whole process, however, and time is economized by the routine adopted. Some idea of the products of these works may be gained from the amount of raw material used. One thousand tons of iron are annually converted into rods, and 120 tons into galvanized iron hooks for fastening the rods to buildings. Two hundred thousand pounds of fine polished copper are used for covering rods, and 100 tons of ingot copper are used for fixtures. Two million glass insulators are required, and about 250,000 terminal points of all kinds are made annually. Sixty-five wagons, with two men to each, are provided in the retail branch of the business. The bars used for connecting the rods are of copper; and in rods of the same metal are so fastened that they make a rod of continuous copper without the slightest break. Professor J. B. Burleigh has invented an equilibrium disk, which it is claimed will increase many hundred times the condensing power of a lightning rod. This disk is of copper, with seventy-two points radiating from a common centre. It is fastened to the bottom of the rod, deep enough in the ground to be surrounded with permanent dampness, and is intended to disarm the clouds of their positive electric force by conveying upwards a negative, or earth current, and thus to establish an equilibrium. The products of these works are sent, not merely to all the States of the Union, but to many foreign countries. There is a branch house established in Chicago, and agencies in all the principal cities in the Union. Their goods are also sent to Canada, for even when the duties are paid upon them, they can compete successfully with British manufacturers. The trade in Canada alone amounts to $50,000 per annum. The point or apex of a lightning rod admits of almost as great variety as the rod itself, and is an important part of the industry. These points are all composed of solid copper, no matter how varied their forms. A very common and popular style is one diverging into four terminal branches from a central stem. Another pattern also rapidly coming into favor is a single point of copper ten inches in length and sharp as a needle at the upper extremity, where it is overlaid with platinum for three-quarters of an inch, and then continued to the base with gilt plating. The greatest pains are taken in the making of these points. After being plated they are burnished precisely as the finest jewellers' work is. As incidental to their main trade, the firm also manufacture a great number of ornamental vanes of every possible kind.

TACONY CHEMICAL WORKS, Charles Lennig, Proprietor, Philadelphia. The original works were founded, in 1831, by Nicholas Lennig & Co., the firm being composed of the present proprietor and his father. The latter had since 1819 been carrying on an extensive trade in the drug, chemical, and dry saltery line, and previous to his arrival in the United States had been connected with an eminent French house, where he acquired much valuable information. Some time after he had settled in this country he discovered that the domestic houses here were accustomed to draw all their supplies from London, paying handsome profits to the English houses, instead of going direct to the sources of supply and obtaining the goods at prime cost. Being cognizant, however, of the various laboratories whence many of these articles were produced, he commenced importations

direct, in a small way at first, and eventually distanced all competitors. In 1827, his son began to be interested in the business, and was charged with the establishment of a branch house in Mexico City. He remained in Mexico two years; but the climate disagreeing with his health, he was obliged to return and abandon the enterprise. He shortly afterwards sailed for Europe with a view to acquire a thorough knowledge in manufacturing chemistry; but, on his return, discovering that he had not thoroughly mastered the manufacture of any one article, he decided to pay another visit, and devote his entire attention to the obtaining of complete and accurate information, in all its details, of the manufacture of some one leading article. On his arrival in Europe fortuitous circumstances directed his attention to the subject of sulphuric acid or "oil of vitriol," and he concluded an arrangement with one of the most celebrated manufacturers, by which, for a stipulated sum, he was permitted to enter his works and thoroughly acquire a knowledge of the whole process of its manufacture. On his return, some few months later, the works were put under construction. These were originally located in what was formerly termed Port Richmond, now the Nineteenth Ward of the city of Philadelphia. The property belonged to Nicholas Lennig, but was of circumscribed limits. Extensive leaden chambers were erected, and the acid was concentrated in platinum stills, so arranged as to be kept constantly at work while discharging a steady stream of concentrated acid. The manufacture proved so profitable, that in the course of the next five years the capacity of the works was increased three-fold, and gradually other articles were added to the original oil of vitriol; among them being alum. The foundation of the present large alum industry of Philadelphia is undoubtedly due to Charles Lennig. When he first started its manufacture in that city, there were but three or four establishments in the United States, but all working in a very expensive manner; so that when these works commenced to produce it, all the other manufacturers, with one exception—he being protected by his being located at a considerable distance from Philadelphia—abandoned the business. The manufacture of soda ash originated also at these works, where for many years a most excellent article has been produced. It is greatly to be regretted that the production of this very important adjunct to many of the largest manufacturing industries has not been protected by legislation so as to render its production a national one, as has been done with that of pig-iron; for soda ash, it may be said, occupies the same relation to many branches of manufactures that pig-iron does to the various iron interests. Chloride of lime, or bleaching powder, was also at one time undertaken at these works, and portions of the very expensive apparatus are yet standing. An excellent article was produced, but its manufacture proving unprofitable it was abandoned. Nicholas Lennig, the senior partner, died in 1835, and the surviving partner associated with him his cousin, Frederick Lennig, who had left Europe some years previously, and had been occupied in the counting-room of his uncle for some time. The style of the firm, however, remained as Nicholas Lennig & Co. until 1859, when new articles of association were entered into, and the name of the firm was changed to that of C. & F. Lennig, and so remained until the death, in 1863, of the junior partner, since which period it has been known as Charles Lennig. Meanwhile the Richmond Works proved too circumscribed for the operations of the firm of N. Lennig & Co., and another property was secured, in 1842, in the then village of Bridesburg, now included in the Twenty-third Ward of the city of Philadelphia. They commenced operations there in that year—the Richmond Works being continued for six years longer and then abandoned—the principal portion of the fixtures and apparatus of the original laboratories being removed to the present works. These cover an area of twenty acres, and are situated at the junction of Frankford creek with the Delaware river, on both of which streams they have a frontage of several hundred feet. On this site are erected various buildings, the principal of which are of stone with slate roofs; the others being of wood with gravel roofs. There are about 100 hands employed, chiefly Germans, and the articles manufactured are designated "technical chemicals." These are sulphuric, muriatic, nitric and acetic acids; alum, sulphate of alumina or "patent alum," sulphate of copper (blue vitriol), sulphate of iron (copperas), soda ash, Glauber salts, aqua ammonia, the nitrates of iron, copper and lead, the superphosphates of lime, all the various preparations of tin for the use of dyers, such as tin crystals, oxymuriate of tin, pink salts, etc., and a variety of other specialties used in the arts and manufactures. The works enjoy a well-earned reputation for their productions. The present proprietor has been identified with many manufacturing industries in this State, prominent among which is the Pennsylvania Salt Manufacturing Company, which may be said to have originated and to owe its existence to the united experience and energy of Charles Lennig, George T. Lewis, and Samuel Fisher, all of Philadelphia. The orig-

inal document in regard to this enterprise was drawn up in the name of these three gentlemen. The connection of Charles Lennig with the company terminated about 1866.

J. RUPERTUS, Manufacturer of Revolvers, Philadelphia. The business was established in April, 1871, by the present proprietor, who purchased Sharp's interests and machinery. The amount of capital invested is $20,000. The business is that of the manufacture of revolving pistols, the specialty being the "New Model Empire, with Rupertus' patent tubular base-pin and cartridge-extractor." Among the advantages claimed for this pistol are: 1st. The accuracy of the retaining and releasing device of the cylinder, it being positive in its action; 2d. The convenience and peculiar placing of the small extracting-rod, the latter being contained within the tubular base or centre-pin; 3d. The smoothness of action of the main-spring, and less danger of its breakage, owing to its peculiar construction; 4th. The facilities offered for loading and unloading; and, 5th. The ease with which the cylinder can be removed for cleaning, etc. About 10,000 Empire and 5000 Sharp's revolvers are made yearly. The factory is situated at No. 1924 North Fourth street, and employment is given to about thirty-five hands.

J. RUPERTUS is a native of Berberiarin, Germany, where he was educated and learned the trade of a gunsmith. He came to the United States in 1847, and married in 1849.

B. VINCENT, Iron-master, Stove Manufacturer and Bank President, was born, August 4th, 1803, in Erie county, Pennsylvania. His father, Hon. John Vincent, removed from New Jersey, in 1797, to western Pennsylvania, and settled at what was then termed Le Boeuff, in Erie county, where he followed the vocation of a farmer. He was one of the first commissioners of the county, and in 1805 was appointed an Associate Judge, which position he filled for forty years, and during that long period was absent from but two sittings of the court. He died in 1860. His son, B. B. Vincent, was educated at Waterford Academy, and in 1826 entered the employ of the Government, as an assistant to General James Kearney, who had been appointed to make the surveys for a projected canal which should unite the waters of Lake Erie and the Ohio river. This survey was finished in 1827, and towards its close he was employed by the State of Pennsylvania to make surveys for and superintend the construction of several divisions of the Pennsylvania Canal. He remained in the service of the State until 1835. In 1838, he became associated in business with David Himrod, and the firm were contractors on that part of the canal which extends from Lake Erie to Beaver, and which was finished in 1845. In 1843, they built the aqueduct and locks at Lockport, Erie county. In 1841, in connection with his partner, David Himrod, he became interested in the iron business, and erected a foundry, and the following year a blast furnace, in Erie, using the bog ores found in that vicinity, which they mined; they continued operating the business for about seven years, when they enlarged the works and engaged extensively in the manufacture of stoves, supplying almost the entire western country in the vicinity of the lakes. They terminated their connection with this branch of their business in 1862. Meanwhile, their attention was directed to the interior of the State, particularly the Shenango Valley, and they were the pioneers in the development of the resources of that section. In 1845, they erected the Clay Furnace, the first one built in Mercer county; this enterprise was followed during the next year by the erection of a blast furnace at Greeneville, and also one at Sharpsville, all of which they operated for several years. In 1852, they built a foundry and opened large stove warerooms on Canal street, Chicago. On the dissolution of the firm of Vincent & Himrod, in 1862, the senior partner was the purchaser of the Chicago property, and in 1866 became associated with Wilson & Stevens in the construction of a grain elevator, changing the Chicago stove warehouse into the National Elevator, which was put into successful operation immediately on its completion, and so continued until October, 1871, when it shared the fate of the city. The firm then disposed of the site and erected another elevator on a more eligible location, a mile further up the river, which is still operated by them. In 1862, he went into the banking business, and organized the ——— National Bank, of which he is President. He was married, in 1834, to Sarah Strong, of Waterford, Erie county, and has several children, one of whom, Strong Vincent, during the rebellion, entered the 83d Regiment as a private and rose to the rank of a brigadier-general. He was killed at the battle of Gettysburg.

ARTEMUS WILHELM, Furnace Builder and Iron Manufacturer, Lebanon, was born in Baltimore county, Maryland, December 29th, 1822. He is descended on the father's side from a German stock, while from the maternal he inherits the English blood. When but a child of six years of age, he accompanied his parents to a farm which they had purchased in York county, Pennsylvania, and there he resided until he was seventeen years of age, aiding his parents in agricultural labors and devoting his evenings and other leisure hours to study, for there was but a poor apology for a school in the neighborhood. About 1840, he went to Shrewsbury to learn the stone mason and bricklayers' trade, although when he had sufficiently acquired a knowledge of the occupation he returned home and gave his assistance to his father for some time longer. In 1844, he went to Baltimore, where he remained a year pursuing his vocation, and saved up $100, of which sum he invested $75 in a lot in Shrewsbury, which he holds to this day. In 1845, he returned home to assist his father in the erection of Furnace No. 1, belonging to the Ashland Iron Company, in the town of that name. In 1847, his father died, and his proficiency and ability as a furnace builder secured him the contract to construct No. 2 Furnace for the same concern. This he accomplished so satisfactorily, and withal with such promptness, that when Robert W. Coleman, himself a noted ironmaster, casually visited these works, he was so favorably impressed with the character of the work here performed that he engaged him to proceed to Cornwall and make a contract to erect Furnace No. 1 on the great Cornwall estate. This was in 1849. He had already made the building of furnaces and the manufacture of iron his special study, being determined to erect only the structures after the most approved designs. From 1845 to 1850, very great improvements had been made in the manufacture of anthracite iron, to which he had already given his earnest attention, taking an active part in the matters pertaining thereto both in Ashland and Cornwall. Having concluded his engagement with R. W. Coleman, he returned to Ashland, where he remodelled the furnaces and set up additional boilers. At this time, and for some while afterwards, he was constantly occupied in different parts of the State in the same line of operations, supervising various improvements at the several points; and as he had by this time gained considerable reputation as a furnace builder, he found it necessary to secure and employ a force of competent mechanics while engaged in his various contracts. In July, 1853, he returned to Cornwall, and was engaged by R. W. Coleman, at a stated salary, as superintendent and assistant. In 1854, he designed and supervised the erection of Furnace No. 2, without any assistance. All the brick needed in its construction he had made on the estate, and all the other articles needed for the structure he himself purchased, even to the most minute matters. All the designs, plans, etc., for this, as well as all other structures which he ever constructed for any one, were the work of his own hands: he is a self-taught draughtsman. When this Furnace No. 2 was completed, it devolved upon him to "blow in" the same, and he continued as supervisor in and out of the office until 1856, when the manager resigned, and the superintendence of the concern devolved upon him; though he did not immediately accept the position, until he had given two weeks' consideration to the offer, which he finally accepted. From that time forward his duties were excessive and arduous. In 1857, he made the estimate for and advised the purchase of the "Dudley," now known as the "Donaghmore Furnace," at Lebanon, and thus another great concern was placed under his care and management. In 1860, he had still other duties added to the responsibilities of his position. At this date R. W. Coleman gave him a general power of attorney to execute and sign all papers, and to take charge of all the finances of the estate. This was a great burden, which he reluctantly undertook, and only after giving the subject a year's consideration. About this date, also, he was elected a director of the Cornwall Railroad, which connected that place with Lebanon, and had been built by R. W. Coleman in 1854. In 1861, he purchased the Cornwall "Turnpike," so miscalled, and became its President. This was a dilapidated plank road, but under his able management it was thoroughly changed, and has become one of the best five-mile roads in the country, having been macadamized in the best manner. In 1863, he recommended the remodelling of the Cornwall Mansions, which was done under the joint supervision of himself and John McArthur, Jr., an eminent architect of Philadelphia. In 1864, R. W. Coleman died, and he succeeded him as President of the Cornwall Railroad. In 1864–'65, he was prominent in the projection and completion of the "Spiral Railroad," running from the base to the summit of "Big Ore Hill." This hill is 300 feet in height, and the road in its construction makes the entire circle of the hill on an ascending grade of 200 feet to the mile, its length being one and a-half miles. Locomotives and trains daily ascend the hill and

A. Wilhelm

transport thence the ores which are mined near its summit. In November, 1865, on the death of Colonel Freeman, he was made one of the administrators of the Cornwall estate, and still acts as such, with a general power of attorney from the heirs of R. W. Coleman. In 1870, he purchased the farm and adjoining property at North Cornwall, designing and erecting a furnace there. In 1873, he was elected President of the Lebanon Rolling Mill. He owns also large interests in different iron companies, etc., outside of the estate of which he has charge. Upon the Cornwall estate there are now six furnaces, which have the capacity of 600 tons per week. He is eminently a "self-made man," and has carved out for himself an honorable distinction among his contemporaries. He has many and warm friends, and he enjoys the utmost confidence and respect of every one in the community where he resides.

FARREN & MAURER, Manufacturers of Upholsterers' Trimmings, Philadelphia. Though but of recent birth, this establishment is already well grown. Started in December, 1872, with forty hands, it has now come to employ over 100. The manufactory is situated on Fifth street, above Market, where the firm occupy three floors, having a frontage of 40 feet with a depth of 85 feet. These premises, though, are proving insufficient for the growing trade, and others will soon be added. The lower floor is devoted to the manufacture of tassels, at which forty women are employed. Above is a long and roomy apartment, where is carried on the twisting and spinning, in this establishment done by steam power. Here also is located the ten horse engine, from whose boiler steam pipes are led all over the building to supply heat. The third floor contains the greater part of the machinery, consisting of seven power looms, five spooling-frames and twelve cord machines; there are also twenty-five hand-looms. Fine silk goods are the article to which the firm give particular attention. They buy the silk, also the worsted and cotton, in its raw state, intrusting it to the dyers before proceeding with the manufacture, on which they are able to bring to bear great practical knowledge and experience, and to this they attribute their success, having earned a reputation for supplying the best goods, through a large wholesale trade in the Eastern and Southern States.

THOMAS FARREN, who attends to the sales and mercantile department of this establishment, was born, June 22d, 1844, in Philadelphia, and when quite young entered the establishment of W. H. Horstmann & Sons, manufacturers of upholsterers' trimmings. Here he remained, holding various positions, till 1872, and then he embarked with Francis W. Maurer in their present enterprise.

FRANCIS W. MAURER was born, January 24th, 1824, in Wurtemberg, Germany. He there served an apprenticeship to the business in which he is now engaged, and in 1848 came to this country. He worked for some time in New York, and then went to Philadelphia and entered the manufactory of W. H. Horstmann & Sons. After two years' service he became foreman and general superintendent, and held this position till 1872.

ANCHOR PICKLE AND VINEGAR WORKS, Heinz, Noble & Co., Pittsburgh; Woodstock, Illinois, and St. Louis, Missouri. In 1866, Mr. Heinz, the senior member of this firm, was engaged principally in the manufacture of brick, at Sharpsburgh, Allegheny county, and also, to a small extent, was directing his attention to the cultivation of horse-radish, and general vegetable gardening. At that time the greater proportion of the horse-radish offered for sale was of a very inferior quality, and the dealers had adulterated it to so great an extent that its use was rapidly diminishing. Mr. Heinz being thoroughly convinced that a pure article of superior quality, through its own intrinsic value, would find a ready sale, determined to engage more extensively in its cultivation and preparation for market. For the better accomplishment of this project, he associated with himself L. C. Noble, a previous partner in the brick-making business at Beaver Falls, Pennsylvania, and the firm of Heinz & Noble was thus formed in 1870. The first year they set out three-fourths of an acre in horse-radish. In order to secure a more extended trade than the home market of Pittsburgh afforded, the senior partner made a canvass of the oil regions, and by his energy and business tact obtained a liberal patronage for their horse-radish. The demand increased so rapidly that in the following year, 1871, they found it necessary to give three acres exclusively to this article. The extent of this territory has been enlarged, from year to year, until they now have thirty acres devoted entirely to the cultiva-

tion of horse-radish. They are, without doubt, the heaviest producers of this article in the country. In addition to this specialty, in 1871 they commenced the preparation of their celery sauce, which has attained a wide celebrity. In 1871, they commenced the manufacture of English and American styles of pickles, sauces, etc., and continued adding one article after another to their business, until now the firm is one of the leading houses in this line in the country. The brand of the Anchor Pickle and Vinegar Works is known to consumers throughout the country as a guarantee of a first-class quality of goods. At Sharpsburgh, five miles from Pittsburgh, on the West Pennsylvania Railroad, they now have a vegetable garden comprising 100 acres, unquestionably the largest in the State. Their business at this place has increased so that, from at first occupying one small room and employing six hands, they now use the whole of a three story brick building, with sheds adjoining and other sheds in the neighborhood, and have a force of operatives ranging from 100 to 150 in number, as occasion requires. They also have in use from eighteen to twenty-five horses, to work the gardens and move the immense quantities of vegetables they raise, and have three vegetable wagons running regularly to supply the Pittsburgh market and grocers. In 1872, the firm admitted E. J. Noble, a brother of the junior member, into the partnership, and the name was changed to its present title, Heinz, Noble & Co. The same year they first occupied the premises Nos. 167 and 169 Second avenue, Pittsburgh. The building has a front of 60 feet, with a depth of 85 feet; a cellar of the same dimensions, and is four stories in height. These premises are all in use by the firm, as well as the building opposite, which is occupied as a storeroom and coopering depot. In addition to the articles already mentioned, they manufacture sauerkraut to a very large extent. During the past year, they have handled over 3000 barrels of this article, and doubtless do the largest business in this line of any firm in the country. At the commencement of their pickling business, they experienced much difficulty in procuring a vinegar of sufficient strength for their purposes; and in order to supply this want they determined to make it themselves. They are now manufacturing not only what they require for their own use, but are also supplying large quantities to the trade. They produce three grades of the article—single, double and treble strength of white wine vinegar—as well as dealing very extensively in cider vinegar. At present they have a capacity of 400 barrels of vinegar per week. In this article, as well as in all their other productions, they are unexcelled in quality. With respect to the pickling business and its great increase, it may be stated that in 1871 they brought from their Sharpsburgh garden sixty barrels of pickles. In 1872, they manufactured over 200 barrels. Finding that section of country not well adapted to the growth of the vegetable, they secured, in 1874, the product of about 500 acres in the West, and have put on the market at least 15,000 barrels during the past season. In the spring of 1873, the firm opened a branch office in St. Louis—using a small room merely as a sample room at the outset—but there, as well as at home, their trade increased rapidly, and in August of the same year their business obliged them to take other premises. The building they then occupied, and still continue to use as a storehouse, fronts on the levee, and is 16 by 120 feet and four stories in height. They have also completed arrangements for immediately starting a vinegar factory there, equal in capacity to the one in Pittsburgh. The office, warehouse and vinegar factory are located at No. 504 North Second street. This branch is in the especial charge of E. J. Noble, and he is ably assisted by J. D. Graves, who is permanently located in that city. In the spring of 1875, the firm entered into an arrangement with the Woodstock Canning and Pickling Company, by which they took charge of the establishment of the latter, located at Woodstock, Illinois, fifty miles northwest of Chicago, on the Chicago & Northwestern Railroad. The previous efforts of the Woodstock Company to procure parties to conduct their business had resulted unsatisfactorily. The firm of Heinz, Noble & Co. becoming favorably known to them, by reason of their extensive Western business transactions and the high reputation of their goods, they proposed an arrangement with the Pittsburgh firm to also locate there. As an inducement, the Woodstock Company give to the firm the use, free, of the former's building, factory, tenement houses and grounds, costing $25,000. Heinz, Noble & Co., in return, agree to take and prepare for market the product of from 600 to 1000 acres, as may be required. L. C. Noble has immediate charge of this department of the business, and will take up his permanent residence at Woodstock. They also manufacture their celebrated brands of vinegar here, the same as at Pittsburgh and St. Louis, making a total capacity at the three points of over a thousand barrels per week. Hereafter, the central point for the manufacture of pickles and other lines of their goods will be at Woodstock; and, in addition to the manufacturing now carried on at Pittsburgh and St. Louis, the latter places will

constitute distributing depots for the supplying of the country surrounding those respective localities. In regard to the extensive trade this firm command, it may be stated as a fact, that they have built up the business with a rapidity seldom witnessed; they have never failed to meet the requirements of the trade in any article in their line; and they have made it an inflexible rule to never place in market other than a first-class article. To these praiseworthy efforts and aims may be attributed their signal success, and they may be truly classed among the representative manufacturers of Pennsylvania.

H. J. HEINZ, the senior member of the firm, was born, October 11th, 1844, in Birmingham, now termed South Side, Pittsburgh. He was educated in the public schools, and when quite young assisted his father, who was engaged in the manufacture of brick. From that time forward he has always been actively engaged in business pursuits, and yet has an interest in brick-yards at Sharpsburgh, in connection with the manifold duties devolving upon him as a member of the firm of Heinz, Noble & Co. He attends specially to conducting the business of the firm at Pittsburgh, and managing the vegetable garden at Sharpsburgh. Though, comparatively speaking, young in years, his strict business integrity has won for him the respect and esteem of all with whom he comes in contact; and the same remark may apply to the other members of the firm. He was married, in 1869, to Sallie S. Young, residing near Pittsburgh.

L. C. NOBLE was born, May 2d, 1848, in Sharpsburgh, Allegheny county, Pennsylvania. Leaving school when about seventeen years of age, he went into mercantile pursuits, and in 1869 became associated with Mr. Heinz in the brick business, and previous to the formation of the firm of Heinz & Noble. His particular duties in the present firm are having charge of the business conducted at Woodstock. He is energetic in all matters of trade, is thoroughly alive to the interests of the firm, and gives close attention to all the details of the business.

E. J. NOBLE, the junior partner, was born, April 29th, 1850, in Sharpsburgh, and received the usual public school education. He also early entered upon business pursuits, and in 1872 became a member of this firm. He has special charge of the house in St. Louis, and, in addition, attends to the jobbing trade in the principal cities. Although he has not yet reached his twenty-fifth birthday, he has exhibited all the traits that mark the successful business man.

GLEN MILLS PAPER MANUFACTORY, Delaware county, James M. Willcox & Sons, Proprietors. Nearly a century and a-half ago, in the year 1729, Thomas Willcox, an ancestor of the present proprietors, emigrated from England and commenced the manufacture of paper at Ivy Mills, Delaware county, Pennsylvania, which he steadily pursued for fifty years, until his death, in 1779. His son, Mark Willcox, born at Ivy Mills, in 1743, was an importing merchant in Philadelphia until his father's death, when he removed to Ivy Mills and continued the business until he in his turn passed away, in 1827, the mills descending successively to his two sons, John and James. He was the senior member of the firm of Willcox & Flahaven, and married a sister of his partner, whose other sister was married to Matthew Carey, one of the earliest book publishers of Philadelphia. And now the fourth generation, Mark and James M. Willcox, sons of James, carry on this extensive business, and constitute what is believed almost certainly to be the oldest commercial house in the United States. Their principal works are now situated at Glen Mills, about two miles distant from the scene of their former labors. During the greater part of their long history, they have manufactured largely for the different governments. The various currency papers in use in America, including the first Provincial currencies prior to the Revolution, the old Continental currency, the Government currency issued during the War of 1812, the "greenback" currency of the late War of the Rebellion, and, lastly, the fractional legal tender and national bank currencies of the present day, together with the paper for the United States Funded Loan and Internal Revenue stamps, have all been successively produced by the four generations of this family. This firm manufacture a greater variety of paper than any other house either in this country or in Europe. Among their productions may be mentioned the following: Bank-note, bond, deed, policy, stamp, parchment, map, special check, car-ticket, collar, music, plate and book papers. They are the most extensive manufacturers of bank-note paper in the world. They give constant employment to hundreds of people. Their success in business is to be attributed to their persistent efforts to produce none but the highest grade and best quality of paper,

and to their care for the reputation of their house. They are especially noted for their bank-note and other special papers. The currency and stamp papers in use by the United States Government, and which have so successfully prevented counterfeiting, are of their own invention and have been patented by them; and have proved of the utmost importance to the Government for many years.

MARK WILLCOX is the oldest son of the late James M. Willcox, and was born at Ivy Mills, Pennsylvania, August 24th, 1814. He was educated at Mount St. Mary Catholic College, near Emmetsburg, Frederick county, Maryland, and on leaving school entered the paper mills, where his father taught him the business in all its various details. At this period his father was conducting the Hand Mills and manufacturing the principal portion of the bank-note paper in use in the country. He has continued in this calling ever since, being associated with his brother, as above stated. His residence is on the original homestead at the old Ivy Mills.

JAMES M. WILLCOX was born at Ivy Mills, Delaware county, Pennsylvania, November 20th, 1824, and is a son of James M. Willcox, grandson of Mark, and great-grandson of Thomas, the original settler at Ivy Mills. He studied first at A. Bohmar's boarding school, in West Chester, then at Georgetown College, District of Columbia, and graduated, in 1847, from the College of the Propaganda, at Rome, with the degree of Ph. D. He has ever since followed the business which descended to him from his ancestors. He resides at Glen Mills. The family is the oldest Roman Catholic family in Pennsylvania, and its members possess and keep with much reverence the old altar utensils used in the family chapel at Ivy Mills nearly a century and a-half ago. At that time there was a mission at Ivy Mills, attended periodically by the Jesuit Fathers from Maryland, before there were any clergy established in Philadelphia for that purpose. James M. Willcox has published (1875) a work on "Elementary Philosophy and Logic."

CONNELLSVILLE GAS COAL COMPANY, John Lawshe, President; Norton Johnson, Secretary and Treasurer: office, 314½ Walnut street, Philadelphia. This company was organized in 1864, with a capital of $500,000, and owns in fee simple 250 acres of land, with all the improvements thereon erected, in addition to which it is possessed of the coal-right of 3000 acres. The works are located near Connellsville, Fayette county, Pennsylvania, in the centre of the bituminous coal fields. The coal is peculiarly adapted for the production of coke, for which it was tested in 1864. The company built, in 1866 and 1867, 102 coke ovens, which were among the first ever erected, and commenced its manufacture. It came into general use immediately, and found a ready market among furnaces, rolling mills and foundries East and West. Since the financial panic of 1873, the Western trade has almost entirely been cut off; but the company has successfully introduced its use, in the East, in anthracite furnaces, instead of anthracite coal. The capacity of the mines is from 500 to 1000 tons of coal per day. Steam is used for pumping and also for hauling the wagons, by means of a stationary engine of forty horse power and wire rope. There is a force of about 100 hands constantly employed, for whose accommodation the company has erected a number of tenement houses, etc.

JOHN LAWSHE, President of the company, was born, October 19th, 1826, in Lycoming county, Pennsylvania, and is by trade a tanner. He was one of the pioneers of California, and one of the founders of Trinidad City and Yreka City. He thoroughly explored the northern gold region of California. On his return to Pennsylvania, he became interested in the timber region of Clearfield county, and was among the first to open and prosecute to a success the lumber manufacturing business at Osceola, in that county; and also the coal developments of the Moshannon coal basin. He was a member of the House of Representatives of the Legislature of Pennsylvania from that district in 1871 and 1872.

NORTON JOHNSON, Secretary and Treasurer, was born, 1815, in Germantown, Philadelphia, and is descended from one of the earliest settlers of that locality, contemporaneous with William Penn.

FAIRMOUNT MACHINE AND POWER LOOM WORKS, Thomas Wood, Proprietor, Philadelphia. This industry was established in 1839, on a cash capital of about $2500, by John and Thomas Wood, who, as millwrights and machinists, commenced the manufacture of power looms and other machinery for cotton and woollen mills. The location was the same as at present—2106 Wood

street—although somewhat more circumscribed. The business gradually increased, although they met with occasional drawbacks and losses from stagnation in trade. This was notably the case in 1841, occasioned by the failure of the United States Bank, which drew so many into the vortex of its disastrous shipwreck. The line of manufactures grew larger as years advanced, and they did a very heavy business in the construction of looms, producing in 1856 as many as forty per month, which were so manufactured as to be adapted for use either in cotton or woollen factories. They also were extensive builders of lard-oil presses, turning out twenty of these per month; and, furthermore, they engaged in the manufacture of embossed calenders, spooling, winding, beaming, dyeing, sizing and self-acting wool-scouring machines; together with a full line of shafting and gearing, pulleys, coupling, self-oiling hangers and machine work in general. On January 1st, 1861, the senior partner retired from the concern, since which time the present proprietor has had the sole management, with the assistance of Thomas S. Brown, a son of the James Brown hereafter mentioned. The business has been much extended. During the year 1872, a building, 256 feet long, 46 feet wide and three stories high, was erected, in order to concentrate the works, which previously had been somewhat scattered, owing to the additions made from time to time to the original works, extending over a period of thirty years. Besides this, there are other buildings on both sides of Wood street, including offices, occupying a frontage of 230 feet, and a foundry in the rear, of 124 by 45 feet. There are now about 150 hands employed in the entire establishments, and the cash value of products yearly made is about $200,000.

THOMAS WOOD was born, January, 1814, in Leeds, England, and came to Philadelphia when quite young. He went to school in both these places, after leaving which he was indentured as an apprentice to James Brown, of the firm of Brown & McLeod, who were noted millwrights. At that period the business of a millwright included the fitting of their own iron work, so that the pupil was obliged to learn to work both in wood and iron. At the expiration of his apprenticeship, he went to Richmond, Virginia, where he was engaged at Haxall's Flour Mills, as a millwright, and where he remained for some months, when he returned to Philadelphia, having been sent for by his former master, who desired his services. He remained in his employ for some time, and was subsequently engaged by Lewis & Phillips, cotton manufacturers, at Fairmount, as master mechanic, to inspect and keep in order their machinery. He occupied this position until the memorable financial panic of 1837 prostrated so many industries, and this among the number. He had previously, during his leisure hours, constructed a foot-lathe, which he now placed in the third story of his dwelling—being at this time married—and he was enabled to work at home for a while, and he constructed other small lathes. Business continuing very dull in Philadelphia, as indeed it was throughout the North, he was induced to go south, and effected an engagement to erect and operate some patent brick machinery on the plantation of Dr. Ravenal, near Charleston, South Carolina. The remuneration was a good one, for the risk was great, the place being a rice plantation, not the most healthy locality in the world. He remained there one year and eight months, and returned to Philadelphia in 1839, having laid by some funds, with which he started in business with his brother, as above narrated. He was married, in 1836, to Elizabeth McGill, of Lancaster county, who brought him three children, of whom two are living, his eldest son, William, being the senior of the well-known firm of William Wood & Co., manufacturers of cotton and woollen goods. His second marriage was, in 1846, to Isabella Penman, of Lancaster county, and he has had seven children by this union, of whom five are living. He is an earnest member of the Presbyterian Church and is liberal in his charities.

M J. McCAHAN & CO., Sugar Refiners, Philadelphia. This house was established, in 1872, by the co-partnership of William J. McCahan, Thomas Cooper, Jonathan McCahan and Charles Toelpe. A property at Otsego and Morris streets was purchased, of the extent of 120 feet by 216, and the manufacture commenced. The productions of the firm during the first year amounted to about 12,000 barrels of sugar and 3500 hogsheads of syrup; about 7000 hogsheads of molasses being used in the manufacture. The firm have already considerably increased their production, although only in the third year of their existence. The present capacity of the factory is about 10,000 hogsheads of molasses, producing about 20,000 barrels of sugar and about 5000 hogsheads of syrup, the sales amounting to some $500,000 per annum. The firm have in operation nineteen "centrifugals," as the machines now in universal use in sugar

manufacture are called, and which have entirely superseded the old "pot" process; and one vacuum pan of the capacity of about sixty to eighty hogsheads per diem. The number of hands employed is sixty. The firm export to some small extent to Liverpool and Canada.

WHITNEY CAR-WHEEL WORKS, Asa Whitney & Sons, Proprietors, Philadelphia. This is claimed to be one of the largest establishments in the United States devoted exclusively to the manufacture of car-wheels. The works are located on Callowhill street and Sixteenth, and make about 60,000 wheels per annum. The moulding room is 400 feet long and 60 feet wide, and is one of the largest in the country. Two railways extend its entire length, on which carriage cranes are propelled and used for removing the molten iron from the furnaces to the moulds, and the wheels from the moulds to the cooling pits. There are five large furnaces, three of which communicate by tubes with an immense caldron for containing melted iron. There are thirty-six cooling pits, having a capacity for holding at a time 750 wheels. In 1848, the senior partner patented a process for cooling wheels, which secures results of the greatest importance and of which the following is a description: The wheels are taken from the moulds as soon after they are cast as they have become cool enough to bear moving without injury. In this state they are placed in a circular furnace or chamber; the opening through which they have been passed is closed, and the temperature of the furnace and its contents is gradually raised about as high as that of the hottest part of the wheel when taken from the mould. All the avenues to and from the interior of the furnace are then closed, and the whole mass is left to cool as slowly as the heat will pass off by permeating through the exterior wall of the furnace, which is composed of brick 4½ inches thick, enclosed in a sheet-iron case one-eighth of an inch thick. By this process every part of each wheel is raised to the same temperature before the cooling in the furnace commences, and as the heat can only pass off through the medium of the wall and iron case enclosing it, all parts of the wheel cool and contract simultaneously. The time required to cool wheels in this way is three days. In this manner wheels of any form can be made with a solid hub, free from all inherent strain and without the hardness of the chill being in the least impaired. The furnaces used in performing this process of prolonged cooling are so constructed that the combustion of fuel used in heating them may be rendered more or less active at pleasure. The firm employ 200 workmen and manufacture 250 wheels per day, the daily consumption of pig-metal being from sixty to seventy tons. The quality of wheels made in these works has always been superior, the senior partner having had the experience of a lifetime in the business. The wheels are shipped to all parts of the country, and to a considerable extent abroad.

THOMAS, ROBERTS, STEVENSON & CO., Stove Manufacturers, Philadelphia. In 1865, David H. Thomas and Louis E. Roberts associated themselves together under the name and style of Thomas & Roberts — changed in 1866 to Thomas, Roberts & Co. — and established a foundry at Quakertown, Bucks county. Here they prospered from year to year, and in 1868 associated themselves with the firm of W. S. Stevenson & Co., who at that time were carrying on the retail stove trade at No. 313 North Second street, and the house became known by its present name. The works at Quakertown cover an area of over three-fourths of an acre, and were deemed, when first erected, to be of ample size for many years to come; but the success of the firm has been so great, and the demand for their productions so constantly increasing, as to necessitate the building of more workshops, covering a space equal in extent to those at present in use, and thus doubling the first capacity of the foundry. A large number of the best workmen in the country find here steady employment in pattern-making, moulding, casting, cleaning, drilling and mounting. The very best mixtures of pig-iron are only used; and the cylinders and fire-boxes are lined with fire-brick moulded to the shape of the various patterns. Many varieties of cooking stoves are manufactured by the firm: one of these, named "The Times," is furnished of various sizes. It is of the most superior construction, combining all that can be attained in the several qualifications deemed essential to unite economy of fuel with a perfect and equable combustion. Among the numerous specimens of cooking stoves on exhibition at the Louisiana State Fair of 1873, it was singled out and honored with the gold medal, the highest premium bestowed. For parlor use, those of the simplest form, elegance of manufacture and requiring the least manipulation, are the ones best adapted. The "Morning Sun" and the "Star-

light," which are manufactured by this firm, are considered among the best in the country as answering fully to the above conditions. Where furnaces are employed for heating all parts of a building simultaneously from one common reservoir, the "Phœnix Hot-blast Portable Furnace" is offered by them, which is believed to be a great improvement over those formerly made. Here the heat is not consumed up the chimney, but carefully husbanded and retained, in order that the various apartments may be more thoroughly heated. In addition to this, the grates are so arranged that they can be entirely cleansed and all "clinkers" removed without extinguishing the fire, thus allowing an uninterrupted heat to be maintained. In the warerooms of this firm in Philadelphia may be found everything in the shape of heating or cooking apparatus which can possibly be needed, whether the mammoth range, suited to the hotel of a thousand guests, or the giant cooking stoves for the needs of a steamship, or the smaller variety for families, or the simple cylinder which cooks the meal of the humblest artisan or poor sewing girl; great furnaces for heating churches, halls and theatres, and Liliputian stoves for tiny sitting-rooms and nurseries. The elegant drawing-room, the finely wrought hall, the cosy boudoir and comfortable library stove, all are to be seen, of various patterns and designs, and of the best workmanship and durability, and suited to the means of every one. The members of the firm are well known in the community for the honorable manner in which their business is conducted. Their enterprise is great, and their capital is most judiciously employed to their advantage and that of the many dependent upon them.

QUAKER CITY STEAM SOAP AND CANDLE MANUFACTORY, J. Eavenson & Sons, Proprietors, Philadelphia, was commenced by them, in 1858, by buying the right to manufacture a certain kind of soap, called the Quaker City Soap. The firm began operations by renting a building at 731 Hubble street, which had previously been used as a school house. The business at first was a small one, employing only four men and producing during the first year but 200,000 pounds of soap and a small quantity of candles. It was steadily pursued, however, and at the end of the second year it had increased. The improvement thus begun has continued without intermission to the present time, no year having passed without an increase in the business of at least twenty-five or thirty per cent. In 1865, the transactions of the firm had become sufficiently extensive to require a larger and more commodious factory; and they therefore purchased the premises in North Twentieth street, in which the business is now carried on. The property consisted of a lot of ground, 152 feet by 45, partly covered by a building which had already been used as a soap manufactory. This the firm utilized and improved; and also built on the vacant ground two houses, in one of which one of the partners resides. In the first year at the new building, the produce of the firm had risen to some 600,000 or 700,000 pounds of soap, and the progress of the establishment has continued until, in 1873, the manufacture amounted to some 3,000,000 or 4,000,000 pounds, in addition to the usual trade in candles—a trade which, for obvious reasons, is not capable of any very great development. The value of the annual manufacture is about $200,000 or $250,000. Besides their more legitimate business, the firm do a large wholesale trade in starch, soda, wax and other kindred goods connected with their line of business, in which a capital of considerably over $100,000 is invested, without taking into account the value of the real estate. There are at present employed in the business four large "pans" or vats, each of the capacity of about 40,000 pounds, and several smaller ones, in which the boiling process is carried on by means of steam pipes arranged round the inside of the pan. From these the soap is pumped up in its liquid state into a receiver, whence it is poured into "soap frames"—narrow and deep vessels, with movable sides—and placed away to cool. When sufficiently solid, the sides are taken away and the soap is then cut—first into slabs and then into bars—by a very ingeniously adjusted system of wires, and lastly packed in boxes for sale. The success of this firm is due wholly to their starting with a determination to manufacture as good an article, and to sell it at as low a price, as possible. They were content to work quietly and wait until honest and legitimate trade should bring about its own reward. They neglected no just means of extending their business; studying always to improve the manufacture, as increasing efficiency and experience suggested it; and in every way developing the trade. Their confidence in the triumph of the "honest policy" has been fully justified. They took hold of the business without any previous apprenticeship to or special knowledge of it, and at a time when all commerce was weakened and unsettled by the financial troubles of 1857; and simply by closely

adhering to sound principles have brought it to its present state of prosperity.

JONES EAVENSON was born in 1804, in Chester county, Pennsylvania. His father, Richard Eavenson, was a farmer in that county, and he himself, after having run an ordinary common school course, commenced to work at the same occupation. He continued thus until 1835, when he opened a store of the character usually found in country places, carrying on at the same time his farming operations. In the course of time he became proprietor of two farms, and by dint of thrift and perseverance had placed himself in a very prosperous condition. In 1858, he sold his property in Chester county and went to Philadelphia, establishing himself in the soap business, in conjunction with his two sons. He was married, in 1826, to Emily, daughter of John and Mary Valentine, of Chester county.

HALE, KILBURN & CO., Manufacturers of Frames and Mouldings, Philadelphia.—This firm (originally connected with and succeeding to a Boston house) was established, in 1867, in temporary premises on Commerce street, where they carried on business for about two years, in the meanwhile casting about for a more suitable and permanent location. This was at length found on North Sixth street, being part of the premises now (1875) occupied by the firm. The property, which extended 50 feet front by 200 deep, was purchased and the business removed thereto in 1869. This step being satisfactorily accomplished, the firm proceeded with the enterprise which has marked their whole career to adapt the premises to the requirements of the trade, and to prepare in every way for its fullest development. The business transacted in Commerce street had been necessarily limited, the firm being in a transition state on account of the cramped and unsuitable nature of the premises. But on the removal to the new location the business began at once to increase rapidly. The firm, being amply provided with capital, were relieved from many of the difficulties which ordinarily attend new establishments, and their progress was, in consequence, almost unobstructed. Shortly after the completion of the Sixth street premises, they succeeded in purchasing another property on Filbert street, of the extent of 76 feet by 90, which joined the former, and with it formed the shape of the letter L. This was also improved, and the whole forms one vast factory, which may truthfully be said to be in the very first rank among manufacturing establishments generally, and perhaps unequalled in their own particular department. It consists of four double buildings, each six stories in height, covering the whole area of the two lots, with the exception of the necessary space for light, etc., and comprising some 75,000 square feet of flooring. Every possible requisite for the manufacture is found in the establishment, which even includes a machine shop for the making of the machinery used in the factory; all of which is of the best and most efficient kind, and which is being almost constantly added to and improved. The drying rooms, which are the most important element in all wood-working factories, are capable of holding at one time about 275,000 feet of walnut lumber, and will turn out, if necessary, 2,000,000 feet of seasoned lumber per annum. This alone will give some idea of the manufacturing capabilities of the firm. The number of hands employed (for whose use a spacious dining-room is provided) is now (1875) about 200; but the building is calculated to accommodate, when completely filled, nearly double that number. The pay-roll amounts to some $2000 per week. The quantity of lumber, mostly walnut, used in the factory is about a million and a-half feet per annum; the average number of frames produced being about 2000 per diem, besides innumerable miscellaneous articles. The house ship goods of all kinds, both finished productions and material, all over the country, and also export considerably to South America and Brazil. The value of the goods manufactured is about $500,000 per annum. The house is a type of the commercial development of the present century, and a fair example of the results produced by vigorous enterprise and business vim. Though numbering only some six or seven years of existence, it has taken its stand as a leading manufacturing establishment, its productions being absolutely of the first class; it is also capable of nearly unlimited extension.

PHILADELPHIA SCALE AND TESTING MACHINE WORKS, Riehlé Brothers, Proprietors. In the modern scale-making industry the city of Philadelphia can claim absolute priority. In the year 1822, Thomas Ellicott, a millwright of that city, invented the platform scale, and made one for the Philadelphia depot of the Lehigh Navigation Company. This was the first specimen of a modern scale with the graduated

weighing beam, now become universal, and was several years before the establishment of any other scale works in the United States. He added the making of scales as a supplement merely to his more legitimate business, making one or two from time to time as occasion required, the demand for scales being at that time extremely small. Somewhat more than twenty years after this, about 1844 or 1845, the house of Thomas Ellicott & Sons had branched out into two scale-making firms, Ellicott & Gibson and Ellicott & Abbott. The latter firm were located on the site of the present works, and were very successful. In 1849, this firm was changed, and became Abbott & Co., who at one time were the largest scale-makers in the country. The firm of Ellicott & Gibson, whose works were at Fifteenth street and Pennsylvania avenue, underwent a variety of changes until, in 1852, it became the well-known house of A. B. Davis & Co., who, in 1865, were succeeded by Banks, Dinmore & Co. This last firm acquired (in 1867) by purchase the business of Abbott & Co., and removed their works to Abbott & Co.'s location, thus merging the two branches of the old Ellicott house into one. Two years afterwards (1869), the present proprietors, Henry B. and Frederic A. Riehlé, who were already members of the firm, bought the interests of the other partners, and the firm-style was finally changed to Riehlé Brothers. Thus this house is by succession the oldest scale house in the country. They are undoubtedly the largest scale-makers in the State of Pennsylvania, and are surpassed in extent by but two or three in the whole Union. They manufacture every kind of beam-weighing and testing machine, but their principal trade consists in the making of their own patented specialties, some of which are the invention of the present firm; many others being the Davis patents, purchased by them. The main building of the factory is 100 feet by 120, and four stories in height, and the number of hands employed is about fifty. They have their own foundry, and cast their steel fulcrums in the levers by a patent process which retains the full value of the steel when being filed to a gauge. The various parts of the scales are made by private processes peculiar to themselves, and by means of tools of their own invention. They make a point of putting more iron into all their scales, large and small, than other makers, their location giving them an advantage in this respect by enabling them to obtain material more easily and cheaply. Their Railroad Track Scale Chairs weigh twice as much as is usual, and the plates of their dormant and portable scales are of iron, instead of wood. Among the many valuable patented productions of this house several may be specially mentioned. One is the Long Railroad Track Scale, the first of which kind of scale was made by A. B. Davis, in 1850, in which year he made three for the Columbia Railroad, now owned by the Pennsylvania Railroad. This scale has been the subject of various improvements, the last of which has recently (1874) been secured by patent. They are made from 12 to 150 feet in length, and can be produced of almost any length. Besides the three scales above mentioned, another was laid down by A. B. Davis, in 1856, at Cressona, for the Philadelphia & Reading Railroad, and one at Saxton, on the Huntingdon Broad Top Railroad. Another patented production is the Furnace Charging Scale, with independent beams, for weighing the stock as it is fed into the furnace at iron furnaces, glass works, etc. This scale has as many beams as there are different kinds of stock. The beams are as distinct from each other as though each belonged to a separate scale, and are placed in and out of contact with the scale at the will of the weigher, and yet are so perfectly under the control of the manager that the weigher cannot alter the weights or know how much he is weighing, if it is not desired that he should, as the case in which the beams are is locked up, the weigher obtaining his only knowledge of the working by observing the vibration of the indicating points in the slotted hole in the front of the case; this scale was awarded the silver medal at the Franklin Institute Exhibition (1874). Their testing machines also are an important branch of the manufacture, especially the Horizontal Testing Machine, which is built for the purpose of testing chain, wire and hemp ropes, as well as bridge bolts and boiler plate, etc., and is 90 feet long when put up for use, or can be made any length. The construction of the device embodies certain principles that can be modified indefinitely and adjusted to apply any desired strain to any material in any shape or form—including the crushing resistance of iron or stone columns, transverse strain of girders and torsional strain. The Canal Weigh Lock Scale, for weighing loaded boats, in use by the Pennsylvania Canal Company, the Lehigh Coal and Navigation Company, and on the Susquehanna and Tidewater Canal; and the Iron Lever Wagon Scale, for weighing coal, iron, grain, etc., in wagons and carts, are important machines and are protected by patents. They also produce a great variety of smaller work, such as warehouse and grain scales, wheelbarrow scales, bloom and pig-metal scales, etc. The firm have a store in New York and one in Pittsburgh, and intend establish-

ing agencies in all the principal cities. They will shortly construct larger works, for their constantly increasing business demands more space than they now occupy.

PENNSYLVANIA STEEL COMPANY, Samuel M. Felton, President; Eben F. Barker, Secretary; Henry C. Spackman, Treasurer; Luther S. Bent, Superintendent: Office, 216 South Fourth street, Philadelphia. These works are located at Baldwin Station, on the Pennsylvania Railroad, three miles east of Harrisburg, where the company own about 100 acres of land, over a great portion of which the buildings already erected extend, the balance being strictly reserved for other buildings, railroad sidings, etc. All the principal buildings are erected in the most costly and durable manner, due regard being paid to elaborateness of finish. These consist of two large Bessemer buildings, a very large rolling and hammer mill, a foundry, a machine shop, a frog shop, a large new double furnace and various other buildings. The Bessemer buildings are of blue limestone, block pointed, giving them a very handsome exterior; and this, together with the great number of windows and their cappings, produce a very pleasing effect. The same attention to solidity, durability and beauty is to be found in every direction, whether in the elegant engine, with its handsome mountings and deep granite bed of solid masonry; the great variety of steam lifting-pumps, whereby the arms of heavy steel-shafted cranes are lowered and elevated on the huge egg-shaped vessels, which act as the receptacles for the melted composition; or, in the hammer mill, where twelve and eight-ton hammers fall, by a skilful arrangement, from a height of 20 feet and upwards, upon the steel blooms below. The walls of the buildings, the foundations of the engines, the heaviness of the machinery, the immense weight of the great steel hammers, all bear witness to the presence of mechanical skill and scientific attainments in those who superintended their erection. There are two converters, each with the capacity of five tons, and two additional ones are in course of erection. When these new works are finished, it is estimated that the aggregate capacity will equal 50,000 tons of ingots per annum. In October, 1873, the works made thirty-two heats in twenty-two hours, and there were produced in that space of time the enormous quantity of 363,406 pounds of steel; and on several occasions as many as sixteen heats have been made in twelve hours. The average annual capacity of the two converters, first constructed, is given as 30,000 tons. These converters were lined, October 10th, 1873, and were used until September 19th, 1874. During this time, 5,276 "blows" were made, producing 26,380 tons gross of steel ingots; and is by far the largest quantity ever made, with one lining, at any similar works in this country or Europe. In the hammer and rolling mill are manufactured steel rails, of which about 120 tons are the daily product. On one occasion they turned out 140 tons gross from one mill, by one set of rolls, in thirteen and one-third hours, being at the rate of one ton every five and five-sevenths minutes, and of this great quantity only four rails inspected as No. 2. The rails were of the seventy-pound pattern, and were the last of the order for use in the great Hoosac Tunnel, Massachusetts; and all, with the exception of eleven, were fully 30 feet in length. It may be stated, in addition, that the hammered "bloom" for each rail was passed through the rolls seventeen times, each "pass" involving two handlings. The average production of steel is about 12,000 pounds at each heat, and during the twenty-four hours there are twenty-five heats run; thus, allowing for wasting, the daily production of steel rails is about 120 tons, beside a large amount of railroad frogs and crossings. The amount of coal consumed in the forge and rail mill alone is 2000 tons per month, and in the Bessemer plants about 1800 tons during the same period. These figures, allowing 312 working days in the year, give as the annual consumption: pig-iron, 37,404 tons, and coal, 45,000 tons; and the product in steel rails as 30,000 tons. And if this large amount is effected during a season of great depression in every branch of industry, how great must be the capacity of the works to produce when business is prosperous?

THE FOUNDRY OF THE PENNSYLVANIA STEEL WORKS is a building, 97 by 51 feet, containing one cupola, having the capacity of twelve tons per heat. The productions consist of ingot moulds and castings for the steel works generally. The product for one year at these works is given as 3743 tons, requiring 535 tons of coal.

BLAST FURNACE No. 1 was put in blast, October 14th, 1873, and has a stack 60 feet high, a bosh of 14 feet diameter and a blowing-tub engine of 5 feet stroke. The ores reduced here are hematite and magnetic, principally the latter, which is obtained chiefly from New Jersey. The works have a capacity estimated at 9000 tons of pig-metal

per annum. During the first year, 7200 tons were produced, requiring a consumption of 16,800 tons of ore, 12,000 tons of coal and 9600 tons of limestone. The entire product of this furnace is used in the manufacture of Bessemer steel by the company. When in full operation, the establishment employs some 700 workmen, most of whom reside in Baldwin—a village originated by the works, and which has increased so rapidly as to be already seeking corporate honors. The works are under the general management of Major L. S. Bent, who has under him a corps of scientific gentlemen fully conversant with the requirements of their respective positions. The most admirable order, system and guidance is to be found in every department of the Pennsylvania Steel Works, which exhibit, in a remarkable manner, the enterprise, energy, perseverance and inventive resources of the company.

WILSON & MILLER, Manufacturers of Marbleized Slate Mantels, etc., Philadelphia. Twenty years ago S. A. Harrison was engaged in the manufacture of ranges and heating apparatus, and the sale of marbleized slate mantels in Philadelphia. In 1856, he disposed of his establishment to the firm of Arnold & Wilson, who carried on the business at first at (old) No. 146 Walnut street, opposite Independence Square, subsequently removing to No. 1010 Chestnut street, where they remained until the dissolution of the firm, in 1863. As they were dependent upon New England for their supply of slate-wares for some little time after they had been in business, they resolved, if possible, to begin to manufacture them in Philadelphia; and having secured a small factory, and above all a good "marbleizer," soon commenced operations. The work was prosecuted with diligence, and they met with the success their enterprise deserved. After the firm dissolved, as before noted, which was during the gloomiest period of the War of the Rebellion, matters remained quiescent until after the cessation of hostilities. Near the close of 1865, John W. Wilson re-commenced the manufacture of marbleized slate mantels at Nos. 401 and 403 North Sixteenth street, which he carried on on his own account until 1868, when he associated with him Joseph S. Miller, under the present style of Wilson & Miller, and, by the removal of their factory to its present location, they were enabled to carry on the business under still more favorable circumstances. By this time, the beauty and durability of the marbleized slate mantel having been thoroughly tested and acknowledged, the demand became more and more extended, until at the present writing comparatively few mantels of the pure marble are made. For many years in the United States the only use to which slate was applied was for roofing purposes and the production of school-slates. A greater portion of the material used for the former was imported from Wales, while the quarries in New Jersey and Pennsylvania, in the vicinity of the Delaware Water Gap, supplied all necessary demands for the latter. There are at the present time some thirty or more quarries in various sections of the Union, producing annually hundreds of thousands of squares for these two purposes. Pennsylvania possesses within her territorial limits by far the largest as well as the finest deposits of slate at present known in the United States, much of it being in every respect fully equal to the celebrated Welsh; and yet for want of proper development and the scientific working of quarries—especially as regards the necessary machinery for cutting the blocks—manufacturers are dependent, in a great measure, upon the State of Vermont, whose quarries are most admirably conducted and where orders are filled with exactness and celerity. It is less than a quarter of a century ago when Hiram Tucker, in the city of Boston, introduced marbleized slate mantels. Like other novelties, slate-wares had to pass through a critical ordeal, and to be tested both by time and use. It was a work of no small difficulty to overcome the prejudices of those who deemed the cold white Italian marble mantel the beau-ideal of perfection and the only proper and necessary appendage of the aristocratic mansion. But by the gradual growth of a better taste for beauty and harmony of colors, the slate mantel has established its reputation in the community and now takes care of itself. Up to 1863, the firm of Arnold & Wilson were the only house engaged in this business in Philadelphia, the demand being very limited, and the amount produced annually being only that which was governed by the demand. The present manufactory is located at Nos. 1211 and 1213 Spring Garden street, with the warerooms adjoining, at No. 1210 Ridge avenue. Here they possess the most abundant facilities for the manufacture not only of mantels, but for all those other articles which were formerly constructed solely of marble. The slate is received from the quarry in its rough state. First, it is subjected to the cutting process, which is principally done by chisel and mallet. The necessary ornamentation and carving follows, and, these being effected, it is ready for the "marbleizer." The process is a secret, and

known only to but few persons in the country. So rare is this accomplishment that the workman who is an adept in his peculiar business commands a highly remunerative salary; and the manufacturer himself is totally unacquainted with the details of the process. By the action of different powerful chemicals to the surface of the slab, the color is changed. This process occupies about six days; when completed, the polisher steps in, and by the necessary friction imparts a glossy surface, presenting to the eye of the observer the most perfect imitation of marbles of every description. Even the white Italian can be produced from the gray slate, as well as the Egyptian, Tennessee, California, or other celebrated marbles. Granites, porphyries, and last, though not least, walnut, rosewood, mahogany and other woods are perfectly imitated. So complete is the resemblance, especially in the latter, that the beholder can scarcely be convinced that he is not gazing at a polished piece of wood until, by handling the same, he feels the cold, smooth, hard surface of a slate slab. Since the introduction of slate for mantels, it is becoming largely used for other inside ornamentation, such as wainscoting, columns for statuary, linings for halls and vestibules, bracket-shelves, furniture-tops, church-pulpits, bank and other counters, black-boards for schools and colleges, billiard-table beds, shelves for libraries, hearths, kitchen-sinks, wash-tubs, etc. All these are manufactured by the firm.

JOHN W. WILSON was born in Edinburgh, Scotland, September 12th, 1816, but was brought to America by his parents in infancy. After residing in Canada for three years, they ultimately settled in Boston. When sixteen years of age, John W. Wilson entered the office of the Northampton (Massachusetts) Woollen Manufacturing Company, where he remained twelve years. In 1844, he went into the drug and grocery business in that town, where he continued also for the space of twelve years. In 1856, he came to Philadelphia and embarked, with W. A. Arnold, in the range and heating apparatus business at (old) No. 146 Walnut street, opposite Independence Square, removing thence to 1010 Chestnut street, where the firm dissolved, in 1863. From July of that year until the close of the war he had charge of the Hospital Directory of the United States Sanitary Commission. In 1865, he re-commenced the marbleized slate manufacture.

JOSEPH S. MILLER was born in Philadelphia, October 19th, 1846. After receiving a good education in the public schools, including two years' and a-half study in the High School, he was, at the age of sixteen, indentured as an apprentice to learn the marble business. Having served the full period and attained his majority, he became associated with John W. Wilson, and with his practical knowledge is enabled to direct and prosecute the various manipulations which the slate has to undergo in its manufacture.

MARINE RAILWAY, SHIP-YARD, STEAM SAW MILL AND SHIP-SMITHERY, D. Corson, Chester. This establishment was founded, in 1868, by the firm of D. Corson & Co., and was by them continued until the various interests of the other partners were purchased by David Corson. In 1870, he became sole proprietor, and operated the business until his death, which occurred in April, 1872, since which date it has been continued by the estate, with David Corson as attorney. Everything pertaining to the building and equipment of a vessel is here produced except the rigging. The premises are nearly three acres in extent, measuring 244 by 500 feet, upon which are all the buildings required to carry on the various branches. These include a fine saw mill, with a patent bevel saw and the most approved machinery—which is driven by a twelve-horse steam engine—a large blacksmith shop, joiners', mould and carpenter shops, spar-yard and a marine railway for the repair of vessels. There is also a railroad track extending into the yard, which facilitates the transportation of timber and other supplies. During the year 1873, there were seven vessels built in the ship-yard, aggregating 2700 tons. Since the establishment of the enterprise to the close of 1873, the total number of vessels constructed was twenty-four. Eighty-two hands are employed in and about the yard.

DAVID CORSON was born, 1816, in Cumberland county, New Jersey, and was the son of Andrew Corson and grandson of Adam Corson, the latter a native of England, and both of whom were ship-builders by profession. After receiving his education in Millville, New Jersey, he embraced his father's trade, and when twenty years of age engaged in business on his own account, and subsequently commanded different vessels of his own construction. The ship-yard was, meanwhile, carried on by Andrew Corson during his absence at sea. He afterwards associated himself with his

brother, George, in ship-building, at Millville, where he remained until he removed to Camden. He there engaged in building wharves, and established a ship-yard at Cooper's Point, in 1846, doing an extensive business in that line, having as many as six vessels on the stocks in course of construction at the same time. He also laid down the first marine railway ever operated in Camden. In all these undertakings he was sole owner until 1861, when he associated with him William P. Mintz, under the firm-name of Corson & Mintz, who carried on the business until 1865, when the establishment was disposed of. He now started another yard, where he built a few vessels and remained until his removal to Chester. While a resident of Camden, he served as a member of City Councils for six years. During his lifetime he constructed very many vessels; over 100 were built at Cooper's Point during his residence in that portion of New Jersey.

PENN WOOLLEN MILLS, Frankford, Philadelphia, located at the corner of Paul and Meadow streets, have been operated since March, 1870, by John Clapp, who, on July 1st, 1871, formed a limited co-partnership, expiring March 1st, 1874, with Henry Homiller, under the firm-name of John Clapp & Co. The main buildings are two stories in height, 45 by 85 feet, substantially built of stone, to which are attached engine and boiler houses. There are also a capacious two story warehouse and offices of the same durable material. The motive power is derived from a fine forty horse engine, to which steam is furnished by two 40-feet cylinder boilers. There are upon the first floor two sets of the most improved spinning machinery for the manufacture of all kinds of woollen yarns. Upon the second floor, beside other pieces of mechanism, there are four large machines imported by Mr. Clapp from England, adapted to the breaking of all kinds of hard woollen and worsted waste, opening and carding without destroying the staple or leaving any hard threads; these are probably the only machines of the kind in use in the State, and they enable the proprietor to manufacture a large quantity of fancy shoddies from waste material, all colors being separated in such a manner as to obviate the necessity of re-dyeing. The operations employ from twenty-five to thirty hands, and they ordinarily turn off about 1500 pounds of stock per day, though they frequently handle as much as 3000 pounds in the same period. The products of the establishment have gained a wide reputation, which they have fairly earned by their superior quality.

JOHN CLAPP is the son of Jonathan Clapp, an old and prominent manufacturer, now retired from business. He was born in Philadelphia, March 17th, 1837, and received his education in the public schools of his native city. At the age of fourteen, he entered his father's mill and became familiar with all the details of woollen manufacture, but at eighteen engaged in mercantile pursuits, in which he continued till December, 1865, when he took his father's mill, at Milestown, Philadelphia, and operated it until March, 1870, when he removed to Frankford, to increase his facilities and enlarge his business. Enterprising and progressive, he has surely and steadily built up a large trade, and has brought the products of hard waste material to a greater perfection than any man in the State.

FRANKFORD LUMBER YARD, STEAM PLANING MILL AND SASH AND DOOR FACTORY, Hayes, Ellis & White, Proprietors, Philadelphia. In 1853, Miers F. Livezey and William Baldwin, who had previously been engaged in the lumber business as the firm of Livezey & Baldwin, at the present location of the establishment, Frankford avenue and Oxford road, erected a two story planing mill, 40 by 80 feet, and commenced the sawing of lumber and planing of flooring. It was operated by them until April 1st, 1856, when it passed into the hands of Edward Hayes and Amos R. Ellis, doing business as Hayes & Ellis. Having erected an additional three story building, 40 by 60 feet, with two story engine room attached, they introduced, in 1867, the manufacture of sash, blinds, shutters, door frames, bulks, brackets, scroll work, mouldings and turning in great variety. George F. White was admitted to the firm, January 1st, 1871, and the style became Hayes, Ellis & White. They employ an average of sixty hands; the motive power is derived from a sixty horse engine, and all the machinery is of the best quality and improved pattern. The works have a front of 275 feet each on Frankford avenue and Franklin street, the depth being 240 feet. North of Franklin they have a front of 350 feet, extending from Allen to Arrott street, and a depth of 120 feet. The greater portion of this large area is occupied by their lumber sheds and for storage of the large quantities of lumber used in their business.

EDWARD HAYES was born in Chester county, Pennsylvania, February 5th, 1834. After receiving his education at the West Town Boarding School,

he entered, at the age of nineteen, the wholesale dry goods store of William H. Brown & Co., on Market street, Philadelphia, but after the expiration of three years associated with Amos R. Ellis in the present enterprise. He has been a director of the Second National Bank since its organization.

AMOS R. ELLIS was born on the Eastern Shore of Maryland, January 18th, 1835. Having been brought in infancy by his parents to Bucks county, Pennsylvania, he was subsequently educated in the public schools in Philadelphia, under the care of Aaron B. Ivens, and attended the Central High School. After learning the lumber business in the yard of Williams & Ellis and William & David Vanderveer, he became foreman for Perry, Son & Randolph, and continued to superintend their yard until he embarked in the present undertaking. He was a member of Councils from 1868 to 1871.

GEORGE F. WHITE was born in Burlington county, New Jersey, November 13th, 1847. After receiving his education at various schools in New Jersey, including that of Samuel Daron, at Mount Holly, and finally at Crittenden's Commercial College, he entered, at the age of sixteen, the cloth house of Lippincott & Parry. Upon attaining his majority, he purchased a farm near Norfolk, Virginia, but in August, 1870, entered the office of Hayes & Ellis, and so continued till his admission to the partnership.

PETRY, GEISSEL, BAYHA & CO., Carriage Builders, Nos. 487 and 489 North Third street, Philadelphia. This establishment dates from December, 1864, when Nicholas Petry, August Geissel and John Bayha associated in partnership under the firm-name of Petry, Geissel & Bayha. Their works were located at Nos. 480 to 486 St. John street, where they started with twelve hands, but the number was soon afterwards increased, as their manufactures were in demand. At the close of the first year, R. M. Braithwait became a member of the firm, when the style was changed to the present one. In the summer of 1870, they erected a four story factory building, 100 feet by 26, in the rear of the original shops, and two years after extended the works through to Third street by the erection of a new wareroom, 74 by 40 feet in dimensions. They now have a front of 40 feet on Third street, with a depth of 225 feet to St. John street, on which they have a frontage of 52 feet. They have a force of eighty-five hands, and employ none but the most skilful artisans. The stock and materials used are the very best the market affords, and are carefully selected by the individual members of the firm, who are all experienced mechanics and contribute their own labor to the production of their manufactures. Their specialty is large or family carriages, turning out about 150 of these yearly, valued at $250,000. Their carriages are warranted to be equal in style, finish and durability to any made in the country, and they have gained an enviable reputation as the producers of first-class work.

UNION SPOKE, HUB AND RIM WORKS, John G. Davis & Son, Proprietors, Philadelphia, were established, about 1848, by William B. Steelman, Isaac B. Eldridge and Washington Fitler, under the firm-name of Steelman, Eldridge & Co., the capital being furnished by John G. Davis. They were located at Hanover street wharf. This firm having been subsequently dissolved by the withdrawal of William B. Steelman, it was reorganized as Eldridge & Fitler. The business having been afterward divided, the hub business was carried on in the same works by Washington Fitler, and the spoke and rim department was conducted by Isaac B. Eldridge and John G. Davis, continuing the firm-name of Eldridge & Fitler. Mr. Eldridge having withdrawn in March, 1859, it was conducted by John G. Davis alone until 1861, when, by the admission of his son, Samuel H. Davis, Jr., who had previously assisted him in the management of the works, the firm assumed the present style. In 1854, the works were removed to Front and Canal streets, where they were destroyed by an incendiary fire, October 12th, 1868. The present property, at Leopard and Otter streets, having been purchased, February 14th, 1869, and fitted up with the requisite machinery, the new works were put into operation May 1st of the same year. The property is 130 by 167½ feet, and the main building is three stories in height, 50 by 130 feet, to which is attached a back building, 17 by 130 feet, beside the necessary smaller buildings and accommodations. The building is filled with all the necessary machinery for turning, throating and finishing with machines adapted to bending handles, chair-backs, etc. The power is derived from a forty horse engine. They produce spokes, rims, plow-handles, shafts, hammer-handles, chair-backs, etc. About 600,000 spokes are turned out per annum, and between 400,000 and 500,000 feet of lumber are consumed in the manufacture of other articles.

JOHN G. DAVIS was born in Philadelphia, in 1809. He left school at the age of eleven years and was brought up in the ship-chandler business. At the age of nineteen he went South and became associated with Abraham Godwin, as the firm of Godwin & Davis, cotton brokers, at Mobile, Alabama. After a successful business career of twenty-seven years, he retired from business and returned to Philadelphia in 1855, where he finally embarked in the present enterprise. He was one of the originators of and for many years a director in the Consolidation Bank, but has eschewed all political office.

SAMUEL H. DAVIS, JR., was born in Philadelphia, June 15th, 1837. Having been prepared at the Coates Street Grammar School, he became a student at the Central High School. He went South in 1854 and joined his father at Mobile, where he remained one year. After his return to Philadelphia, in 1855, he entered the house of Tredick, Stokes & Co., where he remained until January 1st, 1859. He joined his father's establishment, March 19th, 1859, and subsequently became a partner. Though devoted to business and the principal active business manager of the concern, he accepted the Democratic nomination for State Senator of the Second District, in 1862.

EAGLE WORKS, Norristown, Montgomery county, were established, in 1839, by Thomas Saurman, who purchased of John Freedley, May 30th, 1869, a barren lot and erected all the buildings occupied by the works. It is the oldest foundry in that section. After the death of Thomas Saurman, in the spring of 1860, it was conducted for some time by Mrs. Saurman, and then it passed into the hands of William H. Newbold, November 7th, 1860, who willed it to Caletina Newbold, from whom it was purchased by Richard S. Newbold, October 1st, 1862, who associated with him his son, John D. Newbold, on the 1st of January, 1867, as Richard S. Newbold & Son. They manufacture engines, boilers and all the machinery complete for rolling mills, blast furnaces and flour mills. The original founder fitted out, among many others, the extensive rolling mills of James Hooven and William Schall & Co., of Norristown. The present firm have partly fitted out the plate and sheet mill for the Catasauqua Manufacturing Company; have furnished machinery for the rolling mill of the Pottstown Iron Company; all the blowing machinery for the furnace of the Wrightsville Iron Company, and made and erected, in the fall of 1872, the heavy blowing engine of 300 horse power, with a blowing cylinder 7 feet in diameter, in the new furnace of J. B. Moorhead & Co., at Conshohocken. They recently fitted up a rolling mill complete for Horace A. Beale, in the buildings of the old State Shops at Parkesburg, Pennsylvania, and also machinery for the new sheet iron mill of Alan Wood & Co., at Conshohocken, including housings, bed-plates, boiler-settings, furnace-plates, etc., aggregating some 800,000 pounds. They have furnished machinery for other mills and have ample capacity for the manufacture of heavy machinery. They supply all kinds of machinery for saw and grist mills, in addition to rolling mill and blast furnace machinery. The firm have devoted much attention to rotary shears, and they have acquired quite a reputation therefor.

THOMAS SAURMAN, the originator of the works, was born in Philadelphia, on October 19th, 1804. He was the son of John Martin Saurman and Maria Rosanna Peter, a daughter of Abraham Peter, and a grandson of Philip Anthony Saurman, a native of Germany. His mother was also of German descent. He was educated in such schools as Philadelphia afforded in his boyhood. He served as an apprentice with Rush & Mulenberg, at Bush Hill, and was afterward a foreman at Alexandria, Virginia, and in various shops in Philadelphia and elsewhere. In 1839, he came to Norristown and established the Eagle Works. At that time Norristown was comparatively a small place, with few factories except Jamison's and McCredy's (now Simpson's), and he contributed much by his energy and enterprise to the material growth of the town, beside securing for himself a liberal reward for his labor. He was married, June 8th, 1841, to Catharine Spang, the daughter of Jacob and Mary Spang, then High Sheriff of Montgomery county; they had four children, three sons and one daughter. He died on the 11th of May, 1860.

AMERICAN FUSEE COMPANY, William R. Davenport, President; E. D. Ludwig, Vice-President; Edward Gaylord, Secretary; W. A. Galbraith, Treasurer; Erie. This is a regularly incorporated company, with a capital stock of $100,000, which was organized, early in 1874, for the manufacture of fusee matches. The buildings are located on a lot, some two and a-half acres in extent, at Twenty-

first and Liberty streets, Erie. There are about sixty hands employed, mostly women and boys. Although the goods have only been introduced about a year, the sales have reached the rate of $100,000 per annum; and as the demand is constantly increasing, the company propose enlarging the works to three-fold their present capacity, and will include their own laboratory, printing office, box shop, etc. The establishment promises to be one of the most successful in the country, and was started to meet a want long felt, that of a safe substitute for the common phosphorous or friction match. When it is remembered that at least one-fifth of all the fires which occur in America can be traced directly to the agency of matches, the importance of this invention will be readily recognized. The fusees are made by a secret process, and can only be ignited by bringing them in contact with a chemically prepared tablet. The matches or fusees can be transported or scattered loosely around without danger of ignition; and there is nothing used in their composition at all injurious to health, the substance being of such a nature that it may be eaten with impunity. Karl Julius Snyder, a German by birth, is the principal inventor, and devotes his entire time to the perfecting of the process. The secretary of the company is also the manager of the works, and E. D. Ludwig, the Vice-President, has charge of the sales department.

FORD STREET MILLS, Norristown, Montgomery county, are located upon a lot of ground sold by James W. Iredell, on April 16th, 1860, to S. Porter Stinson and Walter H. Cooke, who erected the factory buildings and on February 1st, 1861, disposed of them to Horatio Ogden. The property passed into the hands of John Ogden, on August 12th, 1863, and he in turn sold it, on January 2d, 1864, to Francis Bacon and James Cresson, who engaged in manufacturing under the firm-name of James Cresson & Co. This firm continued to operate the mills until December 28th, 1871, when it was dissolved by the withdrawal of Francis Bacon, and James Cresson, by indenture dated January 9th, 1872, became the sole proprietor. James Cresson died on January 30th, 1872, and the business has since been carried on by J. Clarence Cresson, as attorney for the executors of his father's estate. The main building is 50 by 100 feet, four stories in height, heated by steam throughout and furnished with all the most approved appliances for the prompt extinguishment of fire. The arrangements are so complete that any fire can be smothered by steam from the outside of the buildings. There are, separate and distinct from the main building, boiler house, dye house, spreader house, etc. Upon the whole there is an insurance of $40,000, which covers but a small percentage of the investment. They have a fine seventy horse engine, to which steam is supplied by two thirty-five horse flue boilers, which also supply the necessary heat to the dry house and different apartments of the mill. The mill contains about 1,300 cotton spindles, with carding and spinning machinery in proportion, two sets of woollen machinery, 720 woollen spindles, forty looms and all the necessary preparations for finishing dry goods. They employ about sixty hands and produce about 250,000 yards of Kentucky jeans per annum, beside producing about 100,000 pounds of cotton yarn a year, about one-half of which they consume in their own establishment. They receive the raw material, dye their own work and ship the cloth ready for market. They pay to their employés about $400 per week. Under the efficient superintendence of John McArthur, who has had charge since it passed into the hands of James Cresson & Co., the mills are a model of system, neatness and convenience, while to the able management of the business matters of the concern, by J. Clarence Cresson, the eminent success and prosperity of the works are in great measure due.

GOOD INTENT MILLS, Norristown, Montgomery county, were erected, in 1862, by a committee, consisting of A. R. Cox and others, of a company of married men who had associated for the purpose, and were put into operation by Lawrence H. Ogden, who continued to conduct them for about a year, when they passed into the hands of Henry W. Scott, on the 1st of July, 1863. They ran under his administration for over four years, and at the expiration of that time, on the 22d of August, 1867, were purchased by John F. Starr, of Camden, New Jersey. On March 11th, 1868, they were bought by Perry M. Hunter & Co., and after remaining in their hands for about a year were purchased by Benjamin Bullock, in 1869. The present owner, Thomas Liversidge, purchased and took possession on the 29th of March, 1869; he has considerably extended the dimensions and capacity of the mills, and is still making important and progressive changes, that he may be better able to supply the

increasing demand upon him for the goods of his manufacture. The products are Kentucky jeans, and he receives the raw material and sends it out ready for the market. The capacity is from 10,000 to 11,000 yards per week. The machinery consists of a fifty horse engine, two tubular boilers of ninety horse power, eighty looms, four sets of machines, two self-acting mules, two self-acting jacks, 1450 spindles, and all the necessary machinery corresponding to the same. The main building is 54 by 115 feet and three stories in height. There are separate from the main building a finishing room, dye house and drying room, and boiler house. They employ about eighty hands.

THOMAS LIVERSIDGE, the present owner, was born in Huddersfield, Yorkshire county, England, on April 18th, 1817. He became a hand-loom weaver in his native country, received the usual meagre compensation, and endured the privations incident to his condition in life. Soon after his marriage he emigrated to America, and arrived here in 1842. For six or seven years he labored in various capacities with the manufacturers, and finally took a very active part in obtaining the passage of the ten hour law in the State of Pennsylvania; for his participation in which he was discharged from the factories. He then peddled dry goods in the county of Delaware, Pennsylvania, for about three years, when he opened a dry goods and grocery store in Chester, Pennsylvania. He continued there until the spring of 1863, when he engaged in the manufacturing business at Matsunk, near Conshohocken, in a mill rented of A. W. Supplee, which he continued to run until March 29th, 1869, when he purchased the Good Intent Mills. In stature he is above the medium height, measuring six feet two inches, and has a corresponding physical development. He is well known among his countrymen for his participation in benevolent societies, being an active and prominent member of St. George's Society, and an Odd Fellow, as well as an Ancient York Mason and a Knight Templar. Honorable and candid, he fears not to express his opinion upon subjects of vital interest, and assert himself the friend or foe of any movement affecting the public good. Kind and courteous, he is valued as a friend and admired for the true benevolence of his heart. Though not a politician, he has his strong and active sympathies. He was an old line Whig, has been a consistent Republican, and is a warm personal friend of Governor Hartranft, whom he accompanied to Harrisburg on his inauguration.

MINERVA MILLS, James Lees & Sons, Proprietors, Bridgeport, Montgomery county. The property was purchased of Samuel H. Coates, by John Jacobs and Jacob Body, April 1st, 1853, and they, in 1855, erected Mill No. 1, a structure 52 by 126 feet, four stories in height. After completion it was put into operation for the production of fine cassimeres by Samuel H. Needles. He was succeeded by Paul Thurlow, who changed the production to army cloths at the outbreak of the war, and continued to manage the mill until it was destroyed by fire, April 3d, 1863. Thomas H. Wentz having purchased the interest of Jacob Body, May 25th, 1863, the property was sold (October 22d, 1863) by Jacobs & Wentz to William O. Kline, who in turn re-sold one-half interest to John Jacobs, February 4th, 1864, and the mill having been rebuilt by them, was sold, on March 28th, 1864, to James, Joseph, and John S. Lees, associated in partnership as James Lees & Sons. They immediately put it into operation for the production of worsted and woollen yarns, blankets, and jeans, employing about eighty hands. Having been successfully operated it was found necessary to erect Mill No. 2—54 by 135 feet, three stories in height—in 1869, and in 1872, No. 3—56 by 106 feet, three stories in height—was added. They have also a three story rag room 51 by 51 feet, a picker house 50 by 50 feet, and a four story boiler house 19 by 52 feet, with the other necessary outbuildings. No. 1 contains 8 sets of 48 inch cards, with 2292 spindles, 72 looms for jeans, 7 fulling mills, 4 gigs, and all other necessary machinery. No. 2 contains 4 sets of 60 inch and 2 sets of 48 inch machines, with 1440 spindles, 26 broad looms for blankets, etc. The upper floor of No. 3 is employed as a picker house, in which stock is prepared for No. 2; the second floor being occupied by worsted machinery, including 864 spindles, combs, etc., while the lower floor is used as a machine shop and stock room. The motive power is derived from two steam engines, of 40 and 190 horse power respectively, and the whole gives employment to about 300 hands, for whose accommodation there are sixteen dwelling-houses. They produce weekly about 9600 yards of Kentucky jeans, over 11,000 pounds of blankets, and 20,000 pounds of yarn, beside what they consume in their weaving departments. Their goods are well known and enjoy an enviable reputation.

JAMES LEES was born in Yorkshire, England, January 23d, 1803. He received a plain education in the schools of his native country, and entered the mills at ten years of age; beginning by piecing

on a billy, and working his way from one branch to another until he had thoroughly mastered all the details of manufacture. He came to the United States in 1842, and in a few months after his arrival settled in Manayunk, where, after working in the mills of others until 1846, he engaged in business for himself. He purchased the farm upon which he now resides, April 1st, 1847, and in 1849, with Joseph Sehofield, rented Robinson's Mill, on Mill creek, in which they continued to operate until 1851, when they removed to the mill of Daniel Nippes, on the same creek. The partnership was dissolved about 1854, and James Lees rented a mill at Manayunk, now occupied by Sevill Sehofield. He associated with him his son Joseph, as James Lees & Son, March 1st, 1856, and the same year they removed to a mill on Mill creek, in which they operated with six sets of machines until they were burned out, February 17th, 1863. Having associated with him his son John S., March 1st, 1864, the firm purchased the present works, with subsequent history as above. Though far advanced in life, he is active and robust, having well preserved the vitality of mind and body. He is a man of sterling integrity, and enjoys the high esteem of a large circle.

STONY CREEK IRON WORKS, Norristown, Montgomery county. On July 21st, 1848, General William Schall and Michael C. Boyer purchased of William D. Lewis the present site, and on April 24th, 1849, the interest of Michael C. Boyer was bought by William Schall, who erected buildings and founded the works. General Schall had been engaged in the iron business all his life, and his large experience, coupled with his inherent energy, rendered him fully competent to push forward the great work before him. He continued to operate the works alone until June 5th, 1865, when he associated with him his two sons, Reuben T. and Edward, and his nephew, George Schall, under the firm-name of Schall & Co. The buildings have been enlarged from time to time. At first a nail mill was erected; this was followed by a rolling mill; then the furnace, and finally the bar mill was erected in the winter of 1872–'73, until they now afford all the necessary conveniences for the conduct of their extensive business. They manufacture in large quantities nails, boiler iron, merchants' iron, and pick iron. They employ, when running to their full capacity, about 200 hands. Situated between the Philadelphia & Reading Railroad, on Washington street, from which sidings extend into their works and the canal, they possess every facility for receiving and shipping goods. The cars are loaded and unloaded within the limits of the works. The products of this establishment are widely known, and it stands as a worthy monument to the enterprise and business capacity of its founder.

WILLIAM SCHALL was born in Berks county, Pennsylvania, on August 7th, 1810. He was educated at different first-class educational institutions of the county. He left school about the age of nineteen, and engaged in mercantile pursuits until 1833, when he purchased the Green Lane Iron Works, in Montgomery county, which he continued to operate until after his removal to Norristown, and the establishment of the Stony Creek Iron Works in 1848. He was the last brigadier-general of the militia elected by the people of his district previous to the war, and had been during the earlier periods of life active in that field. He has been a leader in all prominent public movements, and a director in most of the corporations of his town. He was an ardent supporter of the Union during the late struggle, and sent seven sons to battle for his country. Elected to the Legislature in 1835, he served one year.

GEORGE C. HOWARD, Machinist, Philadelphia, was born at Worcester, Massachusetts, in November, 1824. His father —a man of considerable inventive skill— was in the same business, and proprietor of the first machine shop established in that town. In 1834, he moved, with his family, to Philadelphia, where his son received a fair English education. At the age of sixteen the latter entered a publishing house as clerk, remaining in that position for about a year, when he went to Delaware county, and was employed there in a mill belonging to his father. This occupation proving distasteful to him, he returned home. The true bent of his mind was now shown in various little inventions which he made as improvements on articles of domestic use; but they passed unappreciated. His father subsequently placed him in a grist mill, where his mechanical tastes had full scope, as the proprietor left him in full charge, readily understanding his merit. There he remained till 1837, when he returned once more to Philadelphia, with a view of obtaining a position in some mercantile house. In this he fortunately failed, owing to the peculiar circumstances of the times, and he finally went to work in his father's machine shop on

Broad street. He now found himself in his true sphere of action, and devoted all his energies to business; steadily applying himself to the same till he had thoroughly mastered it and earned a reputation for skill and ingenuity which gained for him many tempting offers from other houses desirous of securing his services. Resisting all these advances, he remained in his situation till his father retired from the business, in 1852, leaving it under the sole control of his son. He now, for the first time in his life, had an opportunity of giving a free rein to his natural talent, and erected the extensive works, on Eighteenth street between Chestnut and Market, which, in point of completeness and extent, are equal to any in that line in the United States. Since entering this establishment he has proved himself a special friend to inventors. He is ever ready to take up a crude invention which has merit in the idea, but lacks mechanical skill in its details. This he will remodel according to established principles of mechanics, and convert it into an article of real practical value. He listens attentively to the inventor's remarks, hearing him with patience till he has seized the important point of the matter, when he can at once decide upon its merits. He is himself an inventor, having produced many machines now in use and pronounced to be the best of their kind extant.

STEADFAST MILLS, Frankford, Philadelphia, were established, in 1868, by Joseph N. Ruch & Co., who commenced operations in a two story building upon the present site, on Willow Brook run, between Orthodox and Oxford streets, with front on Worth street. They were purchased by R. Greenwood & Bault, of the Globe Dye Works, October 1st, 1870, and were immediately filled with new and improved machinery, and put into operation by Joseph Culbert, who, from 1867, had been operating in the Keystone Mills. In the autumn of 1871, an extensive addition—two stories and basement—was made, which fully doubled the former capacity, and completed an L shaped structure 130 by 86 feet, to which are attached capacious engine and boiler houses, stables, etc. The motive power is derived from a steam engine of from 50 to 60 horse power, driven by batteries of cylinder boilers. The 212 looms are arranged in four sections of fifty-two and fifty-four each, which are supplemented by all the necessary side machinery. They produce ginghams, checks, linseys, flannels, skirts, shawls, etc., employ about 150 hands, and turn out about 50,000 yards per week, which are sold from their own wareroom, at 217 Church street, Philadelphia. A quiet and orderly system pervades the establishment, and every possible provision is made for the welfare of the employés.

FRANKFORD HOSIERY MILLS are located on Adam street above Powder Mill lane, Frankford, Philadelphia, and were erected in 1865. Everett D. Hall and Alfred Vezin, associated in partnership under the firm-name of Hall & Vezin, have operated them since that time. The buildings are pleasantly located on a plot of six acres. They are handsome brick structures, and present an imposing appearance. The main building is 100 by 38 feet, and four stories in height. Attached to this is a spacious engine and boiler house two stories in height. Separate from the main building are a picker house 50 by 36 feet, and a finishing room 140 by 36 feet. The propelling force consists of a fifty horse engine, made by Hoff & Fontaine of the Eagle Works, and one of the finest in the country, and two tubular boilers of sixty horse power. The firm have 2100 spindles, which produce about 900 pounds of yarn per day, but they are obliged to purchase large quantities of additional yarn for their hosiery. Their knitting machinery includes all the latest improvements, and with their 225 hands they are enabled to produce 12,000 pairs of hose per day. They have all the most approved appliances to guard against loss by fire. The steam apparatus in every room can be set in operation in a few seconds, and the flames subdued by steam, while all the additional precautions are carefully observed; hose being in constant readiness, with tanks filled with water, as well as a patent fire extinguisher kept near at hand. With characteristic liberality the proprietors have provided everything that can contribute to the comfort and welfare of the employés, and seem fully cognizant of the fact that there is a close bond of union between capital and labor.

JOSEPH S. HIBBS & CO., Stove Manufacturers, Philadelphia. The business of this firm was commenced, by the senior partner, in 1851, with a very limited capital, and, necessarily, on a small scale. At that time they occupied confined premises and employed only a dozen workmen, and, consequently, the amount of work turned out was comparatively

small. But year by year the business steadily increased till it assumed its present proportions. William Kaltenthaler, Henry Grausback, and Adam Landenslayer were successively admitted as partners in the firm. They are all practical mechanics, well skilled in the special branches which they superintend. William Kaltenthaler, the second partner, has had upwards of twenty years' experience as a practical moulder, and has done much to increase the business by the introduction of the vast number of new and elegant designs which attract the attention of the visitor to their large and commodious moulding yard. By progressive steps the firm have advanced and extended their operations till at the present time they possess one of the largest stove factories in the country. The present premises are situated on York and Belgrave streets, having a frontage of 150 feet on the former and 130 feet on the latter. They now employ at least 130 men, and, with their other facilities, are able to turn out a large amount of work. The special features which have mainly contributed to their eminent success are, doubtless, the great number and variety of their patterns and castings, which are said to surpass those of the great stove factories of Germany. The large flasks in the moulding yard are capable of producing almost any size of casting, and have, as well as the cupolas and other machinery, been made at the works. The engine, boiler, and pattern rooms, as well as the different shops, are all remarkable for their judicious arrangement and commodiousness. If any one feature of their manufacture may be said to surpass the others, it is probably the excellence and elegance of their designs, which generally enable them to outvie their competitors.

WASHINGTON MILLS, Norristown, Montgomery county, F. D. Farnum & Co., Proprietors, are located on Washington avenue near Mill street. The property was sold on August 18th, 1841, by Jacob Spang to William B. Huhn, from whom it was purchased, on January 4th, 1844, by William L. Cornog. On July 16th, 1845, he sold three undivided fourth parts to William W. Haley, William H. C. Riggs, and Sears C. Walker, and on August 1st of the same year they associated in partnership with them Alfred Hurst, to whom they sold one-fifth of their interest, and the firm was organized under the name of Walker, Hurst & Co., for the manufacture of cotton and woollen goods, and on September 24th, 1845, the firm purchased additional property of John Freedley. On December 31st following the firm was dissolved by mutual consent, the four partners retiring, and leaving Alfred Hurst to settle the affairs of the firm. At the same time the interest of Sears C. Walker was purchased by Charles M. Morris. On February 16th, 1846, the four partners sold their four undivided fifth parts to Alfred Hurst, who added, on July 15th following, the property of Edward Hurst. The mills passed into the hands of Maria C. Smith, June 16th, 1856, by whom they were sold to Samuel O'Neill, on March 25th, 1857. He disposed of one-half his interest to John Hope, on July 21st, 1859, and they continued the partnership until April 1st, 1862, when it was dissolved by the withdrawal of Samuel O'Neill, his interest being purchased by John Hope. The latter disposed of the property to Peter Farnum, on February 4th, 1863, who ceded his right and title to his two sons, Charles A. and F. D. Farnum, on October 20th, 1864, who subsequently—on April 1st, 1872—organized the present firm of F. D. Farnum & Co. The establishment has been used for a long time as a cotton mill, and has been considerably enlarged by the present firm. The work is carried on in about ten separate buildings, three of which are large and commodious structures. The propelling force is obtained from a fine steam engine of 125 horse power, and six powerful boilers. There is a capacity for 208 looms, with self-acting mules and all the necessary machinery accompanying the same, and about 350 hands. The firm produce in large quantities plaids, checks, ginghams, tickings, Canton flannels, etc., commonly known as Philadelphia made goods. The material is received in the raw state and sent out as finished goods. There are hose in every room, as well as the improved fire extinguishers, for the suppression of any fire that may occur.

NORRISTOWN IRON WORKS, Norristown, Montgomery county, operated by James Hooven & Sons, are located on Washington street. On December 31st, 1845, James Hooven purchased a half interest with Mordecai R. Moore, and having associated in partnership under the firm-name of Moore & Hooven, they erected the rolling mill and engaged in business. This firm continued to operate the works until September 7th, 1853, when James Hooven purchased the interest of Mordecai R. Moore, and became sole owner and proprietor. He associated with him his two sons, Joseph Henry and Alexander, July 1st, 1862, as James Hooven &

Sons, and they have continued to operate to the present time. The rolling and nail mill is constructed after the old style, and contains a 150 horse engine for driving rolls, etc., and a 60 horse engine for driving the fans, nail mill, and machine shop. It has also six double puddling furnaces, three heating furnaces, and eight thirty horse boilers which are heated by the waste heat from the furnaces, and all other necessary appurtenances. It is complete in all its appointments, and produces 4500 tons of skelp iron per annum. In 1868, James Hooven erected one of the most complete blast furnaces in the country; it contains all the modern improvements for convenience of operation. They have in the blast furnace a fine vertical engine of forty inch cylinder and seven foot stroke, with a blowing cylinder eighty-four inches in diameter and seven foot stroke, working direct, which gives a blowing force of 300 horse power. Steam is supplied by two sets of six boilers each, which are heated by the gas from the furnace. The other machinery is all of the very best kind and quality, while the blast furnace itself is 16 feet bosh and 55 feet high, with a patent closed front and four Player's patent hot blast eighteen pipe stoves or ovens. It produces 8000 tons of pig-iron from hematite ores per annum. They secure their ores from their own mines in Montgomery and Chester counties. They employ altogether some 300 hands—about 140 at the rolling mill, 50 at the furnace, and the remainder at the mines. The works have a front of 500 feet on the canal, where they have the best wharf in the town. This, with six trestle and two surface sidings, which furnish all facilities for dumping and loading, gives abundant facilities for receiving stock and shipping product. They own all the cars used in the transportation of ore and stone, as well as a shifting engine built by Grice & Long, for the necessary shifting of cars in their works. These old established works have well earned the reputation they enjoy; and not only are the productions among the best in the country, but the firm itself occupies a place among the most reliable of the State.

JAMES HOOVEN was born in Upper Merion township, Montgomery county, Pennsylvania, March 30th, 1808. He was educated in the select schools of his native township. At the age of fourteen he entered a country store and served a regular apprenticeship to the business. When he reached the age of twenty years he engaged in the business for himself, and continued in that line for nine years, after which he spent seven years in the lime business, and was one of the pioneers in that branch of industry. In 1845, he engaged in the iron manufacture at his present location. He has been President of the First National Bank of Norristown since its organization, and was one of its originators. He is a prominent and useful citizen.

C. B. PORTER & CO., Manufacturers of Japanned, Pressed, and Plain Tinware, etc., Philadelphia, have their works located at 128 North Second street. In 1830, Henry Francis, Charles Field, and Thomas Francis, under the style of Francis, Field & Francis, established the business at 130 North Second street—the adjoining building. They were succeeded, in 1854, by the firm of Hadden, Carll & Menough, composed of John L. Hadden, Harvey Carll, and John Menough; but in 1855, C. B. Porter purchased the interest of the junior partner, and the firm became Hadden, Carll & Porter. In 1860, George Booth purchased the interest of Harvey Carll, and the firm assumed the style of Hadden, Porter & Booth. John L. Hadden retired in 1868, and the business was continued by Porter & Booth until January 1st, 1870, when a co-partnership was formed between C. B. Porter, James Fallows, George W. Haslet, and James I. Flanagen, and the firm organized under its present title. Mr. Porter manages the financial department, while Mr. Fallows superintends the practical operations of the factory. The other partners are engaged in the important duty of disposing of the goods. All have been identified with the business for many years, and are thoroughly practical men. The buildings have a uniform height of four stories, with front of 26 feet on Second street, and depth of 233 feet to Bread street, upon which an addition 30 by 45 feet gives them a commodious L shaped structure. The first floor of the front building is occupied by salesrooms and offices, which communicate with the manufacturing departments in the rear; while the three upper floors and the basement are assigned to the storage and showing of goods. Immediately in the rear of the front building is the refining and tinning department, where they practically tin common gray iron; they being the only house in the United States who have successfully introduced this feature. In this department is a furnace and boiler capable of melting from 600 to 800 pounds at a time of metal composition for wash-boiler bottoms by a process patented and owned by the firm. There are also made their own patent teapot handles, which, after being shaped, are filled with composition to prevent

creasing, bent into the desired shape, and the composition withdrawn. They make from 75 to 100 gross of these per day. The first floor of the building on Bread street is occupied in cutting, pressing, shearing, and crimping tin work, while the intermediate space is filled with the most improved machinery, including a heavy press for stamping large articles, an 800 pound hammer, French raising machine for stamping seamless work, etc., all of which is of the very best quality, and much of their own invention. The second floor of the rear building is divided into different apartments and devoted to the production of wash-boilers and toilet sets, of which as many as 800 sets have been given out on one order. In the wash-boiler rooms reliefs work day and night. They were the first house in the country to introduce machinery for the manufacture of buckets and toilet sets. The third floor is occupied by miscellaneous household goods, among which were made last season 1500 gross of fruit can trimmings. Upon the fourth floor are seven ovens for baking Japan work, three of which are heated by steam and the others by the ordinary process. This department is under the direction of Joseph Hartell, a native of Wolverhampton, England, who has been for over forty years engaged in the trade, having been in the employ of this establishment for twenty-five years, and none but the most skilful artisans are employed. The lower portion of the building on Bread street, forming the arm of the L, is devoted to the manufacture of teapots, which are sold in thirty gross lots and shipped in a nested condition, so arranged that any tinman of ordinary skill can put them together. The third floor of the same building is occupied in making square lanterns, etc. The firm also make speaking tubes and an immense variety of tin goods of the finest quality, employing in their production about 200 hands.

CHRISTOPHER B. PORTER was born in Philadelphia, February 13th, 1825. Having received his education in the private schools of his native city, he went, at the age of seventeen, to learn the tinsmithing, and upon attaining his majority engaged in the business with his brother, as R. & C. B. Porter, at 557 North Second street. After being connected with various enterprises he became a partner in the present establishment in June, 1855.

JAMES FALLOWS was born in Wolverhampton, England, November 24th, 1822. After receiving his education in the schools of Wolverhampton, he learned the tinning business at John Devy's, St. James' Square, Wolverhampton, and afterward rose step by step until he became, in 1839, Superintendent for Gray, Martin & Gray, and continued in such positions for nine years. He came to the United States in 1848, landed in Philadelphia, and the second day thereafter became connected with this house, where he has been for twenty-five years the superintendent of the practical operations of the various firms, having continued in that capacity since his association in the co-partnership.

GEORGE W. HASLET was born in Philadelphia, October 18th, 1842. He received his education in the schools of his native city, and in 1861, entered the establishment in which he is now a partner and salesman.

JAMES I. FLANAGEN was born in Philadelphia, December 28th, 1845. He was also educated in Philadelphia, and became connected with the present enterprise in 1866. He was admitted as a member of the firm January 1st, 1870, and has since devoted his energies, in common with Mr. Haslet, to finding a market and increasing the demand for their productions.

STAR GLASS WORKS, J. Morton Albertson, Proprietor, Norristown. This enterprise was started by the Star Glass Company in 1865, but did not prove very successful. The present proprietor purchased the works in March, 1871, and brought to bear upon them his well-known business capacity and energy, which has already rendered the establishment one of the most prosperous in the country. The buildings are about 250 by 300 feet in dimensions, and are filled with all the appliances of a first-class factory, having the capacity of 100 boxes of window glass per day, beside other miscellaneous work. Among these may be mentioned round, square, and oval shades for covering fancy clocks, wax works, and all specimens requiring protection from smoke and dust: these can be made of any size required up to four feet high and two feet in diameter. About 500 of these shades are made per month. Large numbers of carboys, retorts, etc., are also produced. The window glass made is of all sizes up to 40 by 60 inches, and very much resembles plate glass, as great care is exercised in the selection of the best materials attainable. Coach, car, photograph, picture, corrugated, obscured, and colored glass are also produced at these works All the boxes used in packing are made in the

establishment, and the proprietor owns his own cars, so that he can deliver his goods at the doors of his customers with the least possible breakage. There are accommodations for running the cars directly into the establishment. A fine steam engine of fifteen horse power drives the chasers and furnishes the blast for the furnaces. Sixty-five hands are employed in the various departments. The success which has attended the present proprietor is due to his determination to produce nothing but first-class articles and to his punctuality in filling orders.

CHARLES M. HOWELL'S MARBLE YARD, situated at 139 and 141 North Queen street, Lancaster, was established by him in 1846. The lot of ground upon which his works are erected is 64 by 245 feet in dimension, with an outbuilding, 32 by 45, two stories in height, and another structure of the same nature, 15 by 40 feet. It is the oldest and most extensive marble establishment in this section of Pennsylvania, and since its foundation has never ceased to be a thriving and remunerative institution. Every description of marble work is done; while especially for the cemetery and monumental work, sent constantly from the yard, has it acquired a wide-spread and merited reputation. Moreover, this is the only place in the country where marble mantles and their various appurtenances are manufactured, and in the work attached to this branch of the business the neatest finish and most careful adaptation are manifested. Charles M. Howell employs a large number of operatives and laborers, and among the former are to be found many of the most efficient and skilful artisans in the State. Recently, purposing to erect an extensive steam mill, he has purchased an adjoining property, and within a short time will be in a position, long needed, to operate on a much larger scale and turn out a greater amount of work. Prior to pursuing his business in the present location, he leased of John Lane a property on East King street, and in 1841 established himself there, continuing thus until 1846. By his strict attention to business in all its multifarious details, and by his undeviating integrity, aided by his thorough practical knowledge and sterling administrative abilities, he has won for himself both reputation and wealth.

CHARLES MILLER HOWELL was born in Philadelphia, April 24th, 1814. His father, Amos Howell, was one of the most extensive coach-builders in that city, and died in 1832. On the paternal side he is of Welsh extraction, and of Scotch extraction on the maternal side. Charles attended the schools of his native city until twelve years of age, when he was sent to complete a two years' course of studies at Plainfield, Connecticut. At the expiration of that term he was apprenticed to General Peter Fritz, to learn the business of marble-working. In this capacity he served until he had attained his majority. In 1838, he commenced business on his own account at the corner of Fourth and Race streets, Philadelphia. A year later he removed to Ridge avenue and Eleventh street, where he met with much success. Subsequently, he visited the city of Lancaster, was married to a resident of that town, and in consequence of this event remained there. In 1856, directly contrary to his expressed wishes, he was nominated for County Treasurer on the Democratic ticket, and triumphantly elected, although invariably at all previous elections the Whig party secured majorities ranging from 4000 to 6000 ballots. He has been a member of both branches of City Councils, and also for many years a member of the School Board. In 1872, he was appointed by the mayor Chief Engineer of the Fire Department, and in 1873 elected unanimously by the Fire Association in person. He was afterward repeatedly solicited to fill this position for additional terms, but constantly declined that honor. Upon many occasions various positions of credit and trust, in banks, insurance companies, etc., have been proffered him, but, with rare disinterestedness, such offers have always been steadily refused. In 1835, he joined the Masonic order in Philadelphia, connecting himself with Mount Moriah Lodge, No. 155; and upon removing to Lancaster, in 1841, transferred his membership to No. 43, of that city. In 1852, he was elected Worshipful Master; in 1854, re-elected; and in the same year was appointed District Deputy Grand Master for the First Masonic District of Pennsylvania, which latter appointment he has held since that date. He has passed through all the chairs in the Chapter and also in the Commandery of Knights Templar. In 1871, he was elected Right Eminent Grand Commander of the Grand Commandery of Pennsylvania, and re-elected in 1872. He is also an Odd-Fellow, and has passed through all the chairs in the Subordinate Lodge and in the Encampment. He is the founder of Monterey Lodge, No. 242, in Lancaster, and is a member thereof. He is intimately connected with the Presbyterian Church,

and has been a trustee in it for more than thirty years. He was married, December 28th, 1840, to a daughter of the late John Michael, the well-known proprietor of the Grape Hotel, on North Queen street. He had five children, four of whom are living at the present time.

PERKIOMEN KNITTING MILL, George Fling, Proprietor, Germantown, Philadelphia. The business was originally established, in 1848, by the present proprietor, in a one story frame shop, 18 by 14 feet, situated in the rear of his residence, on the lot now known as No. 4728 Germantown avenue, then termed indifferently Main street or Germantown road. Here, with one man and a boy to assist him, he commenced the manufacture of hosiery in a small way. The business prospered, and was increased from time to time. In 1860, the proprietor went to England, and while there purchased the necessary machinery for making fashioned or wrought hosiery, both wool and cotton; and on his return home was enabled to produce goods equal in every respect to the imported article, especially that variety so favorably known as "Super stouts, half-hose." The present mill stands on the same lot as its predecessor, No. 4728 Germantown avenue, which lot has a front of 37 feet and a depth of 500 feet. The mill is 40 by 20 feet, four stories high, each story being 10 feet in height; an adjoining building, 30 by 15 feet, is used for the engine, boiler, dry house, pressing room, etc. There are also the necessary outbuildings for dye house, and bleaching and packing rooms. Twenty hands are employed in the factory; and from twenty to fifty hands—according to the state of the trade—who are supplied with work to be performed at home. The works are under the management of his son, Thomas W. Fling.

GEORGE FLING was born, September 22d, 1819, in London, England. His father, Barnabas Fling, was a noted silk dyer of that time and engaged with Reynolds & Sons. The lad attended school until about his fifteenth year, when he went to the silk dyeing business in the same establishment with his father. About this time the latter removed to the United States and settled in Filbert street, Philadelphia. In 1837, George came to this country and joined his father. He left Philadelphia, towards the close of 1839, to take charge of Mr. Hale's silk dyeing and printing establishment, in Rahway, New Jersey. In 1841, he started in business on his own account, in Germantown, as a dyer and finisher of hosiery. Among his patrons during that and succeeding years were Aaron Jones, one of the principal hosiery manufacturers; also Charles Spencer and Martin Landenberger. He continued in this business until 1844, when, owing to ill health, he was obliged to relinquish it. He then commenced to make stockings at William Allen's establishment, though he met with a strong opposition from the Stocking Makers' Trade Union. This opposition he fought and conquered so completely that in 1848 he started the knitting mill, as above stated. During the War of the Rebellion, and at the period when Pennsylvania was invaded, he closed his factory and was enrolled in Captain Biddle's company, in which he served at Chambersburg, Williamsport, Hagerstown, etc. In the following year, his son, Thomas W. Fling, together with other of the hands employed at the mill, enlisted in the army, and after faithful service were honorably discharged, and all returned safely home when the war closed. In politics, he was an old line Whig until that party merged in the Republican, since which period he has always given a strong and consistent support to Republican candidates and measures. He was married, on November 1st, 1840, to Ann Maria Harris, by whom he had five children, of whom three survive; she died in Germantown, January 25th, 1853. On January 27th, 1859, he was married to Sarah Ann Winterbottom, by whom he has three children, all of whom are living.

WILLIAM H. HORSTMANN & SONS, Manufacturers of Dress Trimmings and Military Goods, Philadelphia. This house was founded, in 1815, by William H. Horstmann, a native of Cassel, in Germany. He had learned the trade of silk-weaving in France, and, emigrating to the United States in the above-mentioned year, established himself in Philadelphia as a manufacturer of fringe, laces and trimmings of various kinds. He married the daughter of Frederick Hoeckly, a German settler in Philadelphia, and also a manufacturer of fringe, coach-lace and tassels. He devised several improvements in this trade, especially by introducing varieties in the styles and patterns of this class of goods, there being at that time only two patterns used in the trade, which were known as the Jefferson pattern and the Monroe pattern.

In 1824, he introduced into this country from Germany the use of plaiting or braiding machines, and about the same time he was the first to introduce into this country the use of the Jacquard loom, for weaving patterns in textile fabrics. His location was in the first instance at No. 59 North Third street, but within a short time he removed to a store next to the Harp and Crown tavern, afterwards known as the City Hotel, and continued his business within a short distance of this point for many years. In 1828, he commenced the manufacture of military trimmings as a special department, and this branch has grown to most important proportions, Horstmann's military goods being in demand throughout the country. The firm have also executed large Government contracts in this line for the War and Navy Departments. In 1831, he established a branch house in New York city, and about the same time erected a factory at the corner of Germantown road and Columbia avenue. The factory was continued here until the erection of the extensive building at Fifth and Cherry streets, where the works, salesrooms and offices of the firm now are. This massive structure is six stories high, and extends 140 feet on Fifth street and 200 on Cherry street, and reaches back to Race street. The separate departments into which the business is divided are thirty in number. More than 1000 distinct looms and machines are in use in the building, many of them very costly and some invented and used exclusively by this firm, the motive power being supplied by a steam engine of fifty horse power. The area covered by the works is about 14,000 square feet. The number of hands employed is very large, about 500. When the erection of a vast factory at this point was first proposed, a strong opposition was made by the holders of the neighboring property. The ancient German Lutheran Church and burying ground, since removed, stood opposite the site, and a bill was introduced into the Legislature to forbid the use of a steam engine within 100 yards of any place of worship. The interests which such a bill would have affected injuriously, especially those of several newspapers, roused a strong opposition to it, and it failed to become a law. In 1845, William H. Horstmann, the founder of the house, retired from the business, and his two sons, William and Sigmund, assumed the management; and it was under their direction that the new building, above described, was erected. The goods produced by this house are of almost endless extent and variety. They include goods woven from all the various textile fibres—cotton, wool, silk, etc.—in every style, color and pattern, and are used for an infinite number of purposes. Narrow woven goods are the staple production, made up into material for dresses for both sexes, for use in daily life, and for regalia for "societies;" for the costumes of the stage, the upholstering of houses and of carriages, the uniforms of soldiers, together with equipments for the same, and for funeral purposes. The raw material used in the manufacture is to a great extent very costly, and their storerooms often hold as much as $200,000 worth of goods in an unworked state. There are two rooms devoted to power looms in the factory, one for coach lace and one for other styles of weaving, in which about 250 of these machines are constantly running. The braiding machines in the coach lace room are very noteworthy. The cord to be covered with braid is drawn through an opening in the middle of a flat, circular, metallic plate, about 15 inches across. Up to a point on this cord, about a foot above the plate, the threads of the braiding material converge, like the ribs of a tent-roof, and there weave in and out and out and in, as the coating of braid grows, and the covered cord rises and is wound away above. The weaving is accomplished by the motion of the spools below that carry the different threads of the braid. These spools stand in uprights, which are carried round and amongst each other in curved slots in the above-mentioned broad metallic plate. All but two of these spools run in and out among each other, with a swift, easy and intricate motion, and so rapid that the eye can hardly follow it, while one or two special spools run steadily round and round among the twisting spools with the most extreme swiftness. Many other machines, displaying equally ingenious mechanism, are used in the factory. The various details of equipment manufactured and supplied by this house are also important, both for their number and the superior quality of the manufacture. The one article of swords may be taken as an instance. This trade grew naturally and immediately out of the established army and navy goods department of the works, it being necessary that the sword itself should be furnished together with the sword-belt and other trappings all complete. Every part of the sword and trappings, with the exception of the blade, is made on the premises. The blades are almost all imported from the ancient German sword-blade emporium of Solingen, where, it is said, swords have been made ever since the year 1147, when Count Adolphus of Berg brought home from the East and established there the business of forging Damascus blades. There is in this department a stock of some thousands of blades, of many different patterns and sizes, ready to be set and finished. Any

style of sword can be had from this warehouse, from the plainest kind up to a presentation sword worth a thousand dollars. In addition to their own vast capacity for manufacturing goods, this firm also import and sell large quantities of goods manufactured elsewhere. The house has also two stores in New York and an agency in Paris. The brothers, Sigmund and William Horstmann, the successors of the founder, died within two years of each other, the former in 1870 and the latter in 1872. The business is continued under the same name, and no material changes have taken place. The house is recognized as the leading establishment in their special line in the United States.

DAVID POTTS, JR., Iron-master and Congressman, was born in Pottstown, Montgomery county, Pennsylvania, November 27th, 1794. His father, David Potts, was a prominent and influential business man of Chester county; his mother's maiden name was also Potts. He received a thorough and classical education in his native place, and upon attaining his majority succeeded his father as Manager of the Warwick Furnace, located in Chester county; in this capacity he continued to act with great ability and success until his decease. In 1823–'24–'25, he was a member of the Legislature for the above-mentioned county, and during his terms was noted for his incorruptible integrity, his industry and his well-directed energy. From 1830 to 1836, inclusive, he was the Congressional member from the same place; and throughout the lengthy period, during which he was zealously occupied in caring for the interests of his county and constituents, he distinguished himself by marked ability and public spirit. Many of the most important improvements in his district are mainly and directly attributable to his shrewd foresight and effective efforts; while, when living, he was ever a foremost and energetic mover in all matters having for issue the welfare of his State and fellow-citizens. In politics, he was steadfastly opposed to the Jackson and Van Buren administrations, and in the support and vindication of his own views, actions and opinions, always evinced true loyalty, an undeviating uprightness of mind and heart. He was noted for his scholarly attainments and a large fund of useful and varied information; and was warmly interested in the development of the educational advantages of Montgomery county. He was married, March 4th, 1819, to Anna Nutt May, daughter of Robert May, one of the most extensive operators and largest iron-masters in Pennsylvania. He died at Warwick, Chester county, June 1st, 1863.

PHILADELPHIA EDGE TOOL AND HAMMER WORKS, located at the corner of Church street and Trenton avenue, Frankford, were founded in September, 1869, and operations were commenced in November of the same year by Jonathan Yerkes and Fayette R. Plumb, under the firm-name of Yerkes & Plumb. Mr. Yerkes had been engaged in the same business alone at Veree's Mills, in the Twenty-third Ward, from 1860 to 1869. The main building is 40 by 155 feet, two stories in height, and the balance is a blacksmith shop, one story in height. An addition was made in June, 1873, to accommodate the increasing demand for space. The addition added 3000 square feet more floor room, and makes an entire floor surface in the main building of nearly 11,000 square feet. There is an attachment to the main building, 20 by 40 feet, two stories high, and also a storehouse, 80 by 30 feet. The works are fitted up with the most approved machinery, among which may be noted a fifty horse engine, a tubular boiler, 14 feet in length and 5 feet in diameter, three improved squeezing machines, two trip-hammers, six grindstones, six polishers and all the necessary machinery for the production of hammers and hatchets of every description, with axes, blacksmiths' and machinists' tools in great variety, as well as all the handles used for their tools. The squeezing machines were built according to their own plans, as was also much of the other machinery used in the establishment. The labor of forty-five men, in connection with their admirable mechanical arrangements, enables them to manufacture about sixty dozens of tools each day. They consume in the course of the year about fifty tons of grindstones, 140 tons of steel and from 75 to 100 cords of wood, which is obtained from the South, sawed, split and in condition for turning. They pay about $27,000 per annum for labor.

JONATHAN YERKES was born in Montgomery county, on April 2d, 1830. He is descended from an old German family who emigrated to this country about 1680, and were among the first settlers of that portion of Pennsylvania. They were a family of blacksmiths and tool-makers; his father was a blacksmith, and his great-grandfather and grandfather, associated in business together,

made the first mowing scythes manufactured in this country. He received a fair common school education, and, after learning the blacksmith's trade with his father, entered, in 1848, the edge tool works of Hammond & Sons, located in Montgomery county. After working in various tool shops in New England and other parts of the country, and reaping the full benefit of an extended observation, he engaged, in 1858, in business in a small way for himself, in Montgomery county. In 1860, he rented Veree's Mills and operated them until September, 1869, when he associated with him Mr. Plumb and commenced the erection of their present works.

FAYETTE R. PLUMB is a native of Buffalo, New York, is descended from a New England family and is a brother of R. H. Plumb, of the celebrated firm of Plumb, Burdick & Barnard, late Bell & Plumb, of Buffalo, New York.

WASHINGTON WOOLLEN MILLS, Norristown, Montgomery county, are situated on the Schuylkill river, at the foot of Buttonwood street. They were established by William Hammill, who purchased the ground upon which they stand of Hamilton Balantine, April 13th, 1840. They were bought by David Meconkey, May 24th, 1858, and he in turn disposed of them to Perry M. Hunter, March 31st, 1859. They were considerably enlarged in 1861, and on January 1st, 1864, Perry M. Hunter sold an interest to Samuel De Haven, and it was operated by Hunter & De Haven until November 5th, 1864, when they ceded their right and title to John B. Bishop. William Watt, the present proprietor, came into possession June 3d, 1868. The buildings are large and commodious, the main building being 70 by 49 feet; engine house and drying room, 30 by 49; mixing and sizing room, 30 by 52; dye house, 30 by 55; stock house, 24 by 48. There are, beside, nine good tenant houses for the convenience of the employés. The propelling force is derived from a forty-five horse engine, to which steam is supplied by three cylinder boilers, 30 feet in length and 3 feet in diameter. The machinery consists of five sets of machines, three jacks of 312 spindles each, two mules with 840 spindles and all the necessary machinery for dyeing, drying, sizing, etc. They employ about eighty hands and produce about 2000 yards a day of Kentucky jeans. They receive the raw material and send out their goods ready for the market, manufacturing all they consume except the warps. Under the efficient and energetic management of William Watt, the reputation of these mills, so long and favorably known, has been well sustained. The comfort and convenience of all the employés is well provided for, and no pains or expense are spared to insure the safety of life and property.

WILLIAM WATT was born in county Derry, in the north of Ireland, on May 12th, 1808. He is of Scotch descent and belongs to a family of manufacturers; his grandfather, John Watt, was one of the pioneers in the manufacturing business in Philadelphia, while his father, Robert Watt, was engaged in the same pursuit. The larger part of his education was received in the schools of his native country, but the family came to the United States in 1818, and settled in Philadelphia, where he completed his theoretical education in the select schools. After leaving school he entered the manufacturing establishment operated by his father and uncle, where he soon became familiar with all the details of the production of textile fabrics. He engaged in business on his own account, in October, 1848, and turned his attention to the weaving of Philadelphia-made goods; for nearly twenty years he continued his operations in different locations in Philadelphia. Finding that his capacity was not commensurate with the demand for his goods, it became necessary for him to extend his operations to a larger scale; he accordingly purchased the Washington Woollen Mills, at Norristown, Montgomery county, Pennsylvania, on June 3d, 1868, and under his effective and energetic management the capacity of these mills has been fully doubled. He is a member of the Ancient York Masons and other societies. His care for the comfort of his employés and his liberality as an employer are subjects of the most favorable public comment, while his kindness and courtesy win for him the respect and friendship of all those with whom he comes in contact.

JAMES K. KERR & BROTHERS, Importers and Decorators of China and Glassware, Philadelphia. This business, which is the oldest established of its class in Philadelphia, was founded by Joseph Kerr, who in 1826 opened a store on Market street near Eleventh. He afterwards removed to the old Arcade; and again removed to Chestnut street, opposite the State House. Here the business was carried on with success for twenty years;

and during this time the name of the firm was several times changed, till the final retirement of Joseph Kerr. Since then the business has been continued by his three sons, James K., Henry C. and Joseph W. In 1868, another removal was made; this time to the extensive premises now occupied, No. 1218 Chestnut street, a marble building of four stories, with a frontage of 28 feet and a depth of 235 feet. In addition to this handsome structure, there is at Fourth and Catharine streets a decorating shop, with three kilns, where the ware is decorated. Great quantities of ware are also imported in a finished state, and other is the produce of native potteries. Altogether, the business of this establishment, which is entirely retail, is estimated at $175,000 per annum.

AUVERGNE MILLS, Colonel N. L. Yarnall, Proprietor, South Chester, Delaware county, have a front of 600 feet on Flower street and 140 feet on the Delaware river. The whole property occupies a tract of about two and a-half acres, upon which is erected a dwelling house and stables, in addition to the mills. The main building is a handsome two-storied structure, substantially built of stone, measuring upon the inside 100 by 50 feet; adjoining is a picker house, 30 by 33 feet, also two stories in height, beside a dye house, 44 by 60 feet, a boiler house, 36 by 18 feet, and an engine room, 12 by 26 feet, and all necessary structures for successful operation. The mills were first erected in 1868 by the present proprietor, who put them into operation for the production of jeans, and ran them without serious interruption until October 2d, 1873, when they were totally destroyed by fire. But the mills were rebuilt without delay, almost entirely refitted with new machinery and put into operation, April 1st, 1874. Being but half filled with machinery, they contain two sets of woollen machinery and eighty-two looms, with all the most approved appliances for preparing and finishing. The machinery, which includes all the latest improvements, is propelled by a forty horse Corliss steam engine, driven by two nests of tubular boilers. The operations give employment to about forty hands, consume about 3000 pounds of filling per week, beside a large quantity of warps, and produce monthly about 35,000 yards of goods. The entire force, machinery and productive capacity of the mills, will be doubled.

COLONEL N. L. YARNALL was born near where Media now stands, in Delaware county, Pennsylvania, August 23d, 1812. Having enjoyed such educational advantages as were afforded by the schools of his period, he entered the paper manufactory of Edward Lewis, at the age of ten years, and continued there until he was sixteen, when he became an apprentice to a shoemaker. After attaining his majority, he engaged in business on his own account, but after continuing his trade a few years commenced farming. Having erected a store at Lenni, Delaware county, in 1854, he devoted himself to mercantile pursuits until he was elected High Sheriff of Delaware county, for three years, in 1860. The outbreak of the war found him exercising the functions of that office with dignity and ability, but he subsequently responded to his country's call and entered her service, first as captain of a company of nine months volunteers, and later as lieutenant-colonel of another regiment. His three sons, one of whom died of wounds received at Cold Harbor, also rendered the country good service. After the expiration of his sheriff's term, he became a Paymaster in the United States Army, and was assisted in his duties by the son who had conducted the business of the sheriff's office during his absence. In 1865, he associated in the firm of Lilley & Yarnall, who continued the manufacturing of jeans until he embarked in his present enterprise. He has been for nearly forty years an active member of the Methodist Episcopal Church, in which he is a local preacher. He has been for some years a member of Councils, and is a man of public spirit and enterprise.

MATTHEW ROBINSON BARR, Manufacturer of Stoves, Erie, was born at Harbor Creek, Erie county, Pennsylvania, December 25th, 1817. His grandfather, James Barr, emigrated from county Antrim, Ireland, in 1755; was married to Elizabeth Kirk, and lived in Mifflin county, Pennsylvania, until 1802, when he removed to Erie county with his father, James Barr, Jr.; in 1812, the latter was married to Polly R. Kelly, and acted as a captain in the War of 1812; subsequently, April 1st, 1830, the two last-named persons moved to Mill Creek, Pennsylvania. His maternal grandfather, John Kelly, was a Revolutionary soldier, and noted for loyalty and intrepid bravery. After completing his early education, Matthew R. Barr, then in his nineteenth year, became engaged in teaching school, and pursued this occupation for several

years. His father dying, in April, 1835, he attended to the management of his mother's farm, continuing to teach meanwhile until 1842. In 1845, he was elected Constable of Mill Creek, and was re-elected for the terms of 1846 and 1847, at whose expiration he declined a re-election. He was subsequently connected as salesman with the principal business men and mercantile firms of Erie; notably with Lester, Sennett & Chester, who prosecuted the foundry business in that place. In the summer of 1848, he became general salesman, time-keeper and overseer for the above firm, receiving for his services $500, later $400, and finally $600 per annum. The co-partnership of Lester, Sennett & Chester expiring March 1st, 1851, he, in conjunction with Conrad Brown, purchased the interest of the firm and at once commenced business under the name of Sennett & Co. In 1856, he became interested with others in a contract to build sixty miles of the Philadelphia & Erie Road. They were instructed to begin operations in September of that year, in order to influence certain desired legislation; the company failing to secure this legislation, however, in the following June the President, S. V. Merrick, instructed them to cease work until further notice. Much dissatisfaction arose, and Matthew R. Barr was appealed to for advice regarding the inability of the company to comply with its original engagements. On this occasion he advocated earnestly the continuance of the enterprise; "determined to aid in building a road to Philadelphia," he encouraged his associates to proceed, and trust in the ultimate success which it seemed probable the company might secure. Acting in concert with him, the building was constantly prosecuted, the desired legislation was obtained in 1858, and in 1859 the contract was successfully completed. In 1855, the style of the firm was changed to Sennett, Barr & Co. In 1857, the partners lost heavily by the failure of their western customers, and later, by fire, over $10,000, the insurance companies failing to comply with their agreements; they lost also an additional sum of $10,000 by the sinking of a cargo of stone in Lake Michigan. These heavy losses involved them so seriously that, in 1858, it was necessary to demand an extension of time, and their indebtedness was not entirely liquidated until after M. R. Barr received the profits arising from his railroad contracts. In 1858, Brown and Sennett retired from the firm, when the co-partnership of Barr & Johnson was formed. The real estate was then sold at sheriff's sale, and purchased by John R. Cochran; in 1862, it was redeemed from him, and ultimately, after acquiring by purchase his partner's entire interest, M. R. Barr retired from active business, in 1872. Prior to 1862, the usual and general mode of payment for workmen consisted in supplying them with provisions and dry goods kept in store; but, believing that it would be to the benefit of his employés to pay them in cash, he did so; the beneficial results arising from this measure far exceeded his expectations, and subsequently produced a long and sorely needed revolution in the relations existing between the employer and the employed in that region. In 1852, he was elected a member of the City Council, occupying that position for nearly ten years; he was also for several years President of the Common Council. He has been an influential member of the Board of Trustees of the Erie Academy; and in 1866 was elected a school director, being appointed, in 1866, 1872 and 1873, President of the Board. To the latter position he declined a re-election in the present year, and he is now a member of the Water Commission. He was married, in the spring of 1842, to Laura W. Wright, of Mill Creek, Pennsylvania, and has a family consisting of three children.

RIPKA MILLS, Manayunk (Twenty-first Ward), Philadelphia. These mills were erected by the late Joseph Ripka, who by his enterprise and industry took prominent rank with the influential and useful band of men who have given to Philadelphia her high position as a manufacturing city. He was the pioneer in the manufacture of cottonades in America—a branch of the cotton manufacture, which has now grown to vast proportions. The mills are three in number, the first being erected as early as 1828. Its present dimensions are 94 by 45 feet, and is six stories high, with a basement; it is termed Mill No. 1. Mill No. 2 was erected subsequently, the date being uncertain, and measures 160 by 45 feet, also of six stories, and has a machine shop in the basement, where all the small machinery is built and necessary repairs made; looms are also rebuilt here. Mill No. 3 originally consisted of two mills, one of which was formerly called the Henry Clay Mill; the other portion was owned by David Rising, and by him sold to Joseph Ripka; the other one was built prior to 1831 by one Adams, who sold the same to Whitehead, and from the latter it was purchased by Joseph Ripka; there were also a number of houses included in the purchase. In 1865, these two mills were united by a connecting building, erected by General Patterson. It is 150 by 45 feet.

and four stories high. All these mills are built of stone and operated by water power, the aggregate wheels being rated at 450 horse power. The lot on which the mills are erected is nearly two acres, being about 1000 feet front on the river and 75 feet deep to the canal. Beside the mills, there are dye houses and drying houses also built on this plot, and a coal yard occupies a portion of the same. There is also, north of the canal, another lot of ground, 340 by 32 feet, fronting on Main street, which is devoted to the finishing of goods, to storage and to the offices. Mills Nos. 1 and 3 are devoted to spinning, and No. 2 to the weaving department. The two former contain sixty flat cards, thirty-five roller cards and 20,000 spindles; the latter has 650 looms in full operation. These three mills were successfully operated by their founder for nearly the third of a century, through all the commercial panics which visited the country up to that of 1857, when, with other well-established houses, he was ruined by the non-payment of debts due him. The mills were closed in 1861. After his death, in 1864, General Patterson commenced operating them, and finally purchased them, in 1868, and still continues the proprietor. About sixty bales of cotton are consumed weekly and converted into over 90,000 yards of cottonades and cotton dress goods, completely ready for the market, giving employment to 500 hands. All the mills are provided with first-class force-pumps and hose, as precautions against fire.

JOSEPH RIPKA, the founder of the mills bearing his name, was born, July, 1788, in the province of Silesia, Kingdom of Prussia. When but sixteen years of age, he left his native town, and, for the purpose of gaining a full knowledge of the business he intended to adopt, proceeded to Vienna, where he remained for some time, and subsequently visited various manufacturing towns in Germany and Switzerland. In 1812, he went to Lyons, and, being thoroughly acquainted with the minutiæ of his business, was appointed manager of a large silk weaving works. In the troublous times of 1815, he left France and crossed the ocean. On his arrival in Philadelphia, he located in Poplar lane, now Poplar street, where he commenced the weaving by hand looms of the celebrated article called "Rouen Cassimeres." He met with great success, and had a considerable number of hands employed upon this and other articles of cotton goods. As already stated, he was induced to build a mill in Manayunk, in 1828, for the manufacture of cottonades, and subsequently other mills at various dates. He was also the owner of a spinning mill at Chandlersville, of the City Mills in Philadelphia and of the Pennypack Print Works, near the village of Holmesburg, and where he employed several hundred hands, in addition to the very large number of workpeople at Manayunk. In 1837, the great crisis in the commercial world found him, by his capital, credit and business integrity, able to continue the operation of his many industrial establishments; and this was uninterrupted until the financial panic of 1857, when he was obliged to succumb. It may be said of him that he was the pioneer and founder of the "Lowell" of Philadelphia (Manayunk), where he encouraged everything that would give immediate or prospective advantages to the town; and it is well known among Philadelphia merchants that his subscriptions were never withheld from any enterprise that gave promise of benefit to his adopted country. As a manufacturer, in his line of business he had no superior in the thorough knowledge of every branch connected with it in this country. The Ripka Mills are an enduring monument of the perseverance and energy of their founder. He died in January, 1864.

BROAD STREET MILL, Chester. The first building was erected, in 1851, by John Larkin, Jr., for a planing mill; it was built of stone, and two stories high. In 1855, a machine shop was put up on Mechanic street, for Lees & Smith, who at first leased and afterwards purchased it. These parties erected a foundry (now the dye house). A stone addition was next made to the machine shop. In February, 1856, both Larkin and Lees & Smith disposed of the whole concern to James Campbell, who shortly afterwards connected the two structures by a brick building and changed the same to a cotton mill. General Patterson purchased the property in 1862, from Campbell, and still continues the proprietor. The works occupy nearly an entire square of ground, being 263 feet on Broad street, 272 feet on Mechanic street and 319 feet on Larkin street. The factory is L-shaped, with a front on Broad street of 260 feet, 180 feet on Mechanic street, 40 feet wide and three stories high. Within the arm of the L is a continuous chain of low buildings, greatly adding to the floor capacity of the mill. The old foundry is, as already stated, the dye house and finishing room; there are also the necessary outbuildings on the lot. The mill contains nine 40-inch cards, 6200 spindles and 113 looms, filling the same to about three-fourths of its capacity. The goods manufactured are tickings, stripes, denims, etc., to the amount of 100,000 yards every month, consuming 25,000 pounds of

yarn and giving employment to 110 hands. James Stephens is the Superintendent and General Agent.

PATTERSON MILLS, Chester. The erection of these mills was commenced in June, 1866, and they were completed and entirely fitted with machinery in August, 1867, when they were put into operation. They are situated on a four-acre tract of land between Fifth street and the Baltimore Railroad, and between Penn street and Chester creek. The main building is 335 feet long, 80 feet wide and two and three stories high. The offices, storerooms, picker house, boiler and engine house are in separate buildings, adjacent. The basement of the main building is fitted up as a machine shop and a carpenter shop; in the former all the repairs necessary to be done to the machinery are effected, while in the latter the boxes used for the packing of goods are constructed. The weaving department occupies the entire second floor, and the carding and spinning is attended to in the third story. The machinery consists of twenty-six Keystone cards, 11,888 spindles and 300 looms. These are operated by a Corliss steam engine of 300 horse power, supplied by steam from six multitubular boilers. The outbuildings are furnished with the most approved appliances for preparing and finishing the goods. The articles manufactured are four-quarters sheetings and three-quarters drills, and the mills have the capacity of producing 3,120,000 yards per annum. As a precaution against fire, there are twelve different connections with water pipes and 700 feet of hose always ready for use. James Stephens is the Business Manager and Robert W. Willey, Superintendent.

GENERAL ROBERT PATTERSON, Proprietor of the Ripka Mills, Philadelphia, Broad Street and Patterson Mills, Chester, and the Lenni Mills, of Delaware county, was born, 1792, in the county of Tyrone, Ireland, and is the son of Francis Patterson, a respectable farmer, who, having taken part in the Irish Rebellion of 1798, deemed it prudent to emigrate to the United States, and located in Delaware county, Pennsylvania. His son received a good English education, which being completed he entered the counting house of Edward Thompson, one of Philadelphia's leading merchants. This he left to accept a lieutenancy in the United States Army, the War of 1812 having then commenced. He was promoted to a captaincy and served his adopted country with fidelity and zeal, being regarded as a brave and competent officer, possessing the entire confidence of his superiors in command. When peace was declared, in 1815, he returned to mercantile pursuits, though he continued to take a deep interest in military affairs as an officer in the volunteer force. Passing through the several grades, he was commissioned Major-General of the First Division, which rank he held over forty years. He was in command with his division at Harrisburg, in 1838, during the memorable political disturbance familiarly known as the "Buckshot War;" and in 1844 rendered important military service during the disgraceful riots in Philadelphia during the months of May and July in that year. During the Mexican War, he was appointed Major-General in the United States Army, and was selected by the Government to command the troops destined for Vera Cruz, thence to march on the city of Mexico. General Scott was subsequently ordered to this duty, and General Patterson became the second in command. With his division he participated in the siege and capture of Vera Cruz, and also at the hard-fought battle of Cerro Gordo. When General Scott was relieved from command, he took his place as Military Chief of the Army, his headquarters being in the city of Mexico. When peace was declared, he withdrew the troops from that country, and on his return to the United States once more resumed the occupations of civil life. When the great War of the Rebellion broke out, in 1861, he was again called into active service, and, April 16th, 1861, was assigned by Governor Curtin to command the quota of Pennsylvania—sixteen regiments. He immediately commenced the organization of the men for service in the field, relinquishing, at a great pecuniary loss, the large commercial business in which he was engaged. He was a few days afterwards placed in command of the Department of Washington, his headquarters at Philadelphia. Here he organized an army, next seized and held the city of Annapolis, opening the way to the beleagured city of Washington. He also counselled the Governor of Pennsylvania to enlist and equip twenty-five additional regiments, which was the origin of that fine body of soldiery known afterwards as the "Pennsylvania Reserves." He personally took command of the troops at Chambersburg, June 3d, 1861, and his first achievement was to compel General Johnston to evacuate Harper's Ferry, Virginia. He next encountered the enemy under "Stonewall" Jackson, routed and drove them several miles. His subsequent strategy, though severely censured, has been vindicated by time and is now admitted by the ablest military critics to have been all that could possibly be required of a faithful and com-

petent officer. He was personally thanked by President Lincoln, who placed the greatest confidence in his integrity and judicious conduct. At the close of his term of service, he was honorably discharged, and returned to Philadelphia to engage once more in his extensive manufacturing business. He is noted not only for his great military knowledge, his success as an enterprising merchant and manufacturer, but also for his correct deportment as a citizen and for his liberal and elegant hospitalities to an extended circle of friends, which his long career in public and private life has gathered round him. He has been for an extended series of years President of the Hibernia Society, of Philadelphia.

MCNEILL, DEAN & CO.'S PLANING MILL AND BARGE-BUILDING YARD, Herr's Island, near Pittsburgh. This business was established, in 1855, by A. H. Harvey, Hon. G. E. Warner and Hugh McNeill, who associated themselves under the firm-name of A. H. Harvey & Co., at the present location, and continued operations until 1866, when Harvey and Warner withdrew. The remaining partner, with John Dean, having purchased the others' interests, and Henry Bolbright having been admitted into the firm, a new co-partnership was formed under the style which it bears at present. In 1868, James McBrier purchased an interest in the firm of McNeill, Dean & Co., which he yet retains. The establishment is located on Herr's Island, in the Allegheny river, opposite Twenty-eighth street, Pittsburgh, where it covers an area of some seven acres. Upon this are erected a planing mill, 40 by 120 feet, a lath mill, boiler and engine house, offices, storage sheds and twelve tenements for the hands. There is also an extensive boat-yard, where about seventy barges are constructed yearly, chiefly for use on the Ohio and Mississippi rivers. The lumber is received by water, and there is abundance of convenient wharfage, the firm occupying about 1000 feet of river frontage. The planing mill turns out yearly about 4,000,000 feet, about half of which is consumed in the boat-yard. A fine steam engine propels the machinery of the mill.

HUGH McNEILL was born in the county of Antrim, Ireland, September 21st, 1822. His father was a farmer and lime manufacturer, and his paternal grandfather an extensive manufacturer of linen. He was educated in Ballycastle, in his native county, and after leaving school became engaged in agricultural pursuits, and later in the lime manufacturing establishment owned by his father. In 1845, he embarked for the United States, and settled in New York city, where he secured employment in a dry goods store, acting as clerk, book-keeper and salesman. Three successive winters he passed in New Orleans, being employed as time-keeper on the wharves. Leaving New York in the autumn of 1849, he removed to Pittsburgh, where, in the fall of the following year, he entered the lumber business. In 1850, he was employed as a clerk in the lumber office of Hon. G. E. Warner, and there remained until he became a member of the firm of A. H. Harvey & Co. In 1861, and while connected with that co-partnership, he engaged in the coal business, which he relinquished in 1870. He has been extensively interested in many steamboat enterprises; is the Manager of the Allegheny County Workhouse, director of the German Savings Bank and of the Real Estate Bank; director in the Allegheny Gas Company, also in the Uniondale Cemetery Company, and Secretary of the Northern Liberties Bridge Company. In 1874, he was nominated by the Republicans of the Forty-second Senatorial District, and during the last ten years has been an able and valued member of the City Councils. Throughout the last Presidential campaign he was noted for his zealous and efficient support of the Republican party and its principles. He was married, December 24th, 1850, to Mary A., daughter of James Awl, of Pittsburgh.

JOSEPH FUSSELL & SON, Manufacturers of Umbrellas and Parasols, Philadelphia. This business was founded by Lucas Gillingham, who, in the year 1835, commenced the manufacture of umbrellas and parasols at Market and Fourth streets, on the premises now used for a salesroom. He employed at first some six or seven hands, and carried on the business with varying success for twenty years, manufacturing from $25,000 to $30,000 worth of goods each year. In 1856, the business was bought by Joseph Fussell, who soon after removed the manufactory to South Fourth street, below Market. It occupies three floors of a building, having a frontage of 18 feet and a depth of 50 feet. Thirty hands are employed in the factory, and many others work for the establishment in their own homes. The business has steadily grown, and $70,000 is now the estimated value of the yearly produce. During the war the sum was much greater, owing

to the high prices which then prevailed. The firm have a wholesale trade through nearly all the States.

JOSEPH FUSSELL is of Quaker parentage, his ancestors having crossed with William Penn. He was born, August 7th, 1820, in Chester county, Pennsylvania. When he was seven years old, his parents removed to Philadelphia, and he received his education in the Quaker schools of that city. At the age of twenty-four, he went West, and for several years was engaged in various occupations. Returning to Philadelphia in 1847, he entered the employ of Henry B. Fussell, who was then proprietor of the business, Lucas Gillingham having sold out his interest to him in 1842. He became proprietor of the establishment in 1856. Joseph Fussell has one son, William L. Fussell, who in 1874 was admitted to a partnership in the business.

AMERICAN STOVE AND HOLLOW-WARE COMPANY. This business dates back as far as 1848, and was originated by Gibson North and a Mr. Harrison, who, under the firm-name of North & Harrison, sold Stuart's stoves in Philadelphia. In 1851, they removed to Wilmington, Delaware; and, Pliny E. Chase having joined the firm, it became North, Harrison & Co. Under this name they commenced the manufacture of stoves, employing some twenty-five moulders. While at Wilmington, Mr. Harrison died, and on his death Asa North came into the concern, which became North, Chase & North. In 1853, a removal was made to Philadelphia, to the site where the works now are. There the business rapidly increased, and soon over 200 hands were employed. In June, 1863, another change occurred; Asa North had died; Charles Sharpe bought the interest of Gibson North; Edgar L. Thomson was admitted partner, and the firm-name became Chase, Sharpe & Thomson. In 1866, Pliny E. Chase withdrew, his interest being purchased by the other two members of the firm, which then became known as Sharpe & Thomson. No further change occurred till the spring of 1870, when the interests of Messrs. Sharpe & Thomson were transferred to John Edgar Thomson, who had long been a sleeping partner in the concern, and who subsequently assigned the property to the American Stove and Hollow-ware Company. The company is an incorporated one, under the general laws of Pennsylvania, with a capital of $500,000. J. Edgar Thomson was elected President, which post he held till 1871, when he resigned, and was succeeded by William M. Spackman. The works of this company are situated at the corner of Second and Mifflin streets, covering rather more than a whole city block. They are among the largest in the State. The sample room is on Second street, just below Arch, and has a frontage of 30 with a depth of 200 feet. Every description of stove is manufactured by this company, and they are the sole manufacturers of the range known as the "London Kitchener." Many other stoves have been invented and patented by them. In 1864, they commenced the manufacture of plain tinned and enamelled hollow-ware; and during the war large quantities of shot and shell were made for the Government. Machine castings also receive a portion of the firm's attention. The trade now extends through the whole of the United States, and averages $400,000 yearly.

JOHN CROMPTON & CO., Manufacturers of Druggists' Paper Boxes, Philadelphia. This extensive and thriving establishment was founded, in 1844, on a capital of only $75. But the founder, John Crompton, was possessed of much practical experience in the manufacture; and so, soon after starting in business for himself, on Bread street, found success attending his efforts. The manufactory consisted of only one room, 14 by 30, in which six hands were employed; and the products during the first year amounted to about $1500. In 1845, the increase made more extensive premises necessary; and accordingly a removal was made to Second street, below Chestnut. The dimensions of the manufactory then were 25 by 150, the number of hands increased to twenty-five and the yearly produce to about $10,000. In 1851, another removal was found necessary; and this time it was to Market street, below Second. Here the hands employed increased to thirty-five and the produce to $20,000. At this time, too, the character of the manufacture underwent a change. Hitherto the boxes made were of large size, and were principally for hosiery, artificial flowers, etc. The manufacture of these were discontinued; small fancy work took their place, and the boxes which have been made since are those used by druggists and jewellers. This change necessitated a change of premises, and so, in 1853, the establishment was removed to Fourth street, just below Market. These premises, though, were soon found too cramped for the growing trade, and a removal was shortly made to Third

street, above Arch. Here the manufactory was carried on for sixteen years, during which time the hands employed increased to seventy-five and the annual produce to $35,000. In 1870, the concern was removed to the premises at present occupied, on Arch street, above Second, the workrooms extending through three tenements. In the following year, Harvey Platt became a partner, the firm-name becoming John Crompton & Co. The produce of this establishment is now sent through the entire country; and the trade has thus extended itself purely on the merits of the article manufactured, the boxes being generally acknowledged to be equal, and even superior, in workmanship to those of foreign make, which they have now almost entirely superseded. The staple of those manufactured are druggists' boxes, but others are also made for perfumers, jewellers, etc.

LUCIAN B. FLANDERS, Machinist and Engineer, Philadelphia, was born at Bethel, Maine, September 16th, 1819. His education was limited to a few years' study at a country school, about the best that could be obtained at that early date. Like many boys, he was inclined to go to sea; and so, when quite young, shipped on board a whaler, and afterwards followed the sea for several years in various ships, visiting many foreign countries. He at length returned home, but could not yet be content to remain long on shore; and so, in 1837, again went to sea, this time in the service of the United States Navy, on board the "Siam." On his return home, in 1840, after a three years' cruise in the Mediterranean, he decided to abandon a sea-faring life and choose some other profession. Accordingly he commenced to learn that of machinist and engineer, at Lowell, Massachusetts, in what was then called the Old Locks and Canal Machine Shop, one of the largest establishments of its kind in the United States, and now known as the Lowell Machine Shop. Being quick to understand the working of machinery, L. B. Flanders soon became master of his trade; and after serving his time at both steam engine and locomotive work, he went to Boston and worked in the Boston and Worcester Locomotive Shops and in several other locomotive railroad shops. He then obtained a position as engineer on the railroad, and for some time worked on the Boston & Lowell Railroad, and afterwards on the Boston & Maine Railroad. Then he went into the employ of the Concord & Northern Railroad Company, at times working in the shops, at others running locomotives. It was about this period that his great inventive power began to show itself. His first invention was a Locomotive Cylinder Boring Machine. This was light and portable, and completely revolutionized the manner of repairing or re-boring locomotive cylinders. This machine can be taken to the locomotive, and in a few hours do the work which, prior to its invention, required weeks to accomplish; and this, too, without disturbing any part of the locomotive except the cylinder head and piston. Not at that time possessing the means necessary for the introduction of his invention, L. B. Flanders, in 1847, accepted an offer to go to Cuba as locomotive engineer. He remained in that island about two years, and on his return home accepted the position of engineer on the New York & Erie Railroad, at that day completed as far as Dunkirk. In 1852, he removed to Cleveland, Ohio, and there commenced the introduction of his Patent Locomotive Cylinder Boring Machine. He at once established a machine shop, where he manufactured his machines, in addition, building steam engines and doing a general machine business. He also invented a Railroad Frog, for replacing locomotives and cars on the track. These were carried on each train; and, in the event of a locomotive or car merely running off the track, it could by means of the frog be at once replaced. He also made improvements in his Locomotive Cylinder Boring Machine, adapting it for use in marine and stationary engines, pumps, etc.; and he patented a Link and Radius Planer, for planing locomotive links. But not being satisfied with Cleveland, and judging that he would have a better field for work in a district possessing more railroads and steam power, L. B. Flanders, in 1860, removed to Philadelphia. He did not at once establish a shop in this city, but for four years confined himself to the boring out of steam and blast cylinders and to the sale of his Locomotive Cylinder Boring Machine, Railroad Frog and Link Planer. But, his business steadily increasing, and finding that to employ others to build his machinery was not sufficiently profitable, he again opened a machine shop, situated at the northwest corner of Twelfth and Noble streets. Prior to this, L. B. Flanders had patented several other inventions, among which may be mentioned a Spring Packing for piston heads, a Steam Boiler, Propeller Blades, and means of affixing propeller blades, shafts, etc. He had also invented a machine of a very intricate and interesting nature, for bending the wires used in fastening corks in mineral water bottles. After the establishment of the shop, the

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business increased very rapidly. During the first year it amounted to over $30,000, and branches were established in New York and Pittsburgh. In 1872, the Philadelphia establishment was removed to the premises now occupied at Eleventh and Hamilton streets, where from fifteen to twenty hands are employed. In connection with the establishment a specialty is made of boring out cylinders in their present position. Repairing is also done and a general machine business. L. B. Flanders also manufactures the Corliss steam engines. His machinery and tools are of the best make the country produces, and the shop is one of order and cleanliness. Among its customers are the largest manufacturers in the country.

SCHMIDT & FRIDAY, Distillers, Allegheny City. Some time in 1866, the late William McKim leased a distillery on Twelfth street, Pittsburgh, where he engaged in business on his individual account, and so continued until the decree of the United States Government was promulgated that all distillers should be the owners of the property where they carried on their operations. The firm of Schmidt & Friday, who had for some time been engaged as importers and dealers in wines and liquors, had been heavy customers of McKim, purchasing nearly all his productions. In September, 1868, they associated with him in business, under the firm-name of William McKim & Co. Having purchased the site of the present works, located at Thirty-eighth street and the Allegheny Valley Railroad, in Allegheny City, they erected a distillery 150 feet square, with a daily capacity of 400 bushels. In April, 1872, William McKim died, and the present firm have continued the business under the style of Schmidt & Friday. The produce of the distillery is widely and favorably known among merchants and consumers. Their warehouse is located at the corner of Eleventh and Penn streets, and is a four-storied structure, 30 by 120 feet in dimensions, fitted up in the most approved manner. It was first occupied by them in the autumn of 1865, the previous location having been the original establishment founded by William Schmidt, in 1836. The firm carry a stock valued at $200,000, and their importations as well as their productions are in great demand.

WILLIAM McKIM was born, February 26th, 1823, in Jefferson county, Ohio. His father, being a farmer, reared the son to agricultural pursuits, and he enjoyed only the limited advantages furnished by the common country school. As he grew up, his active temperament chafed under the restraints of home and prompted him with a desire to see something of life at a distance. He journeyed down the Ohio to Cincinnati, and thence to St. Louis. He subsequently worked upon a farm in Western Virginia, and thence, after a brief residence in Steubenville, Ohio, went to Freeport, Pennsylvania, where he engaged in the distillation of pure rye whiskey. He remained at that place until 1866, when he removed to Pittsburgh and established the distillery there, with the results above noted.

G. W. SCHMIDT was born, 1843, in the city of Pittsburgh, in whose public schools he received the greater part of his education. After leaving school, he was engaged for four and a-half years in the dry goods business, and then sailed for Europe. After his return to the United States, he associated himself, in the fall of 1865, with his present partner and engaged in business as a liquor merchant, since which date he has pursued a career of marked success. He is a director of the Arsenal Bank, of Pittsburgh, and also of the Odd-Fellows' Savings Bank; and his large business experience renders him a valuable member of these boards.

WILLIAM J. FRIDAY was also born in Pittsburgh, in 1843. He was educated at the Academy of the Western University of Pennsylvania. After leaving school, he assisted his father in the market until 1857, when he entered the liquor establishment of Joseph Schmidt, who, in 1854, had succeeded to the business established by his father, William Schmidt, in 1836. He has since continued in the particular line he then adopted, in which he is still actively engaged. He was elected a member of the Common Council in 1868, and of Select Council in 1871. He is a director of the National Trust Company, of Pittsburgh, and also of the Enterprise Insurance Company, of the same city; and is likewise a large stockholder in various corporations.

WILLIAM JAMES MULLEN, Inventor, Manufacturer, Philanthropist and Prison Agent of the State of Pennsylvania, was born, 1805, in Lancaster, Pennsylvania. His father was a carpenter by trade, and a soldier in the War of 1812; being disabled in the field, he was unable subsequently to provide the necessary support for his family, and,

in consequence of this affliction, a situation was procured for his only child, as an errand boy, in Philadelphia, where, at the age of nine years, he commenced to earn his livelihood. He remained at this one place until he was sixteen years old, and gave the utmost satisfaction to his employer. He was now indentured to a Mr. Bruno, to learn the jewelry business, and his mechanical skill was developed at an early stage of his apprenticeship; when seventeen years of age, he was enabled to earn six and seven dollars per week, by laboring after regular hours, and which not only was expended judiciously for himself, but a large portion he contributed towards his father's support. When he attained his majority, he married and commenced business on his own account, in Philadelphia, as a manufacturer of jewelry and gold-chaser—the latter chiefly embracing the carving and ornamentation of articles of jewelry and watch-cases. He was materially assisted at the outset of his business life by the loan of $250 from the "Scott Fund," which he received through the hands of the then Mayor of Philadelphia. This fund was held in trust by the city authorities to be loaned to young American mechanics, of good character, who were married and who could give undoubted security that the money advanced would be repaid at such stipulated times as provided for in the will of Mr. Scott: the terms being precisely the same as those cited in the will of Dr. Benjamin Franklin. With this borrowed capital he started his establishment at (old) No. 72 Market street, and prospered greatly as a manufacturer of fancy jewelry of the most costly description, consisting chiefly of fine gold chains and variegated chased seals and slides of a rare and beautiful quality; ladies' breastpins, watch-hooks, finger rings, etc., set with gems, embellished and ornamented in a tasteful manner, for which there was soon a great demand. This business proved exceedingly lucrative, as most of the articles were of his own designing, he having a remarkable aptitude for devising new patterns. He finally attempted the production of watch dials, and in the end proved eminently successful; but it was a long time before he attained to the perfection of the manufacture, as he was obliged to proceed step by step in the various processes required to produce an article equal to those imported. It should be remarked, in this connection, that at this period of time there were but two successful gold dial factories in the world; one of these was located in Liverpool, England, and the other in Geneva, Switzerland. These two establishments had a monopoly of the entire business, not only in the making of dials for European consumption, but of all those exported to this and other foreign countries. This being the case, it will be readily perceived that the proprietors of these manufactories would refuse to impart any of their knowledge, skill or machinery, to enable a rival to compete with them; nor was it possible even to obtain a single workman from either of these localities who should be able to make the delicate and beautiful article, the perfection of the goldsmith's art. Not only did this difficulty present itself, but there was also a chemical secret to be discovered before the dial could even be made, much less ornamented; this secret was only known to two persons living—and these were the proprietors of the two factories already referred to. It was, therefore, necessary to commence a series of experiments, and this was effected at a considerable outlay of capital, to discover that combination of acids by which the alloy of silver and copper could be extracted from the body of the gold dial, which would leave a pure gold surface on its face, thus enabling it to exhibit the lines of engraving and engine turning to a great advantage, adding much to the beauty of the work and affording a striking contrast to the brilliant polish of the letters on the dial. This process is technically called "coloring;" and after it had been discovered by this ingenious American, he was offered $10,000 for the secret; but he refused it, preferring to possess it alone, and he himself ever after attended to the coloring of each piece turned out from his factory, until he finally relinquished business. But there was another difficulty to be overcome before success could be attained; and this was in the fashioning of the twelve letters or characters to be soldered on the face of the dial, indicating the hours. The method followed both by the Swiss and Englishman was to melt the gold, make a wire of a square form, a miniature bar, and cut the latter into small pieces, which, being soldered together, would form the required I, V and X that were wanted to make the twelve figures or numbers to be afterwards affixed to the face of the dial. This was not only a tedious but an expensive method of procedure, as the letters were apt to spring and alter in shape while being soldered, by means of the blow-pipe, to the dial. When this happened the work would be spoiled, as all the various stages through which the dial had thus far already passed, coloring, engine turning, engraving, etc., were ruined. This difficulty arose from the excess of heat applied to the solder placed around the edges of the letter to be affixed, causing the foreign metal or solder to flow upon the face of the dial and spoil its appearance. To obviate this

difficulty, Mr. Mullen conceived the idea of placing the solder upon a bar of gold in the bulk, affixing the same by means of the heat of a charcoal fire, previously coating the surfaces with borax, and lastly passing the bar between steel rollers until it should be of the requisite thickness of the letters or characters to be formed. These were afterwards pierced by means of dies or punches, in a lever press operated upon by the foot. In this way 300 sets of characters or figures could be produced in a single day, perfect in every respect and far superior to the three sets, the produce of a single workman under the old system in the same time; and this great increase in the matter of production, at once so economical and so perfect in their proportions, enabled the proprietor to dispose of his wares at a rate of 33⅓ per cent. less than the price charged by the European manufacturer. In this mode of piercing the characters he was greatly assisted by Mr. Tyler, the machinist who built the lever press and made the dies used. By this time it was known in Europe that all that was necessary to complete the undertaking of manufacturing gold watch dials in America was a first-class "Rose Engine," or turning lathe, similar in some respects to that used by bank note engravers for producing on the dies the consecutive lines, and which is technically known as "lathe work." This machine was required for the ornamentation of the dial previous to soldering the characters or letters upon it. Not long after this want became known abroad, a first-class workman, an engine turner by profession, emigrated to this country from Switzerland, who brought with him a superior complicated lathe, his own property, and which was said to be composed of 22,000 parts and susceptible of making millions of designs by the changes of the bearings against the rosettes; and, in addition to these, there were various eccentric chucks, which could be removed or replaced at will; these changes and adjustments would enable the operator to turn any desired shape within or without a watch case or watch dial, and if necessary engrave the likeness of an individual, or an animal, landscape, etc.,—the pattern being previously prepared. As the possession of this lathe was all that was required to achieve success in the manufacture proposed, it was purchased by Mr. Mullen for the sum of $2000, who also secured the services of the former owner, in order that the latter might impart the necessary instructions regarding its intricate operations. Having perfected himself in its movements, he determined to discontinue his jewelry manufactory, where he had already some twenty-five or thirty hands employed, and devote his attention exclusively to the manufacture of gold dials and watch cases. In 1834, he removed to New York, with his workmen, and started the business in that city where he prospered for four years and until the great financial panic of 1837 and '38. His operations had been very heavy; he had sold largely to merchants on credit, had indorsed their paper, which was discounted by the banks, and when these merchants failed the institutions looked to him to protect the paper he had indorsed—which amounted to over $150,000. He met the obligations manfully, and from time to time paid them by sacrificing his real estate and personal property, so that by the year 1840 there was but $1500 of this indebtedness remaining, which he amply secured to his creditors. About this time the financial pressure was such as to cause him to inadvertently neglect to renew the insurance policy of $10,000 on his establishment, which took fire and totally destroyed his extensive workshop, machinery, tools, etc. After this heavy loss he closed up his business in New York and returned to Philadelphia, with his large family, to begin the world again. By the assistance of two kind and disinterested friends—Messrs. Ferdinand J. Dreer and John C. Farr—he was enabled to fit up a factory in Library street, and, his workmen having rejoined him, he started once more in the manufacture of gold dials and watch cases. He devised a plan of operations of mutual advantage to employer and employé, which consisted in paying a certain amount for each piece of work done, the skilled workmen who were the foremen of each department contracting with him for the amount of labor performed, and these men were allowed to take apprentices to themselves for instruction in the art and for their benefit. The consequence was that these workmen earned for themselves from $40 to $80 per week, which amount would be regulated by the progress their apprentices made in learning the mysteries of the craft. The "coloring" of the gold was always attended to by the proprietor, Mr. Mullen, in his secret laboratory. From Library street he eventually removed his establishment to the southwest corner of Walnut and Dock streets, where he continued prospering until 1854, when he disposed of the business to his friend, Randolph Peters. This he did for the purpose of accepting the office of Prison Agent, a position which was created expressly for him, and which he has ever since and still continues to hold. Before closing the record of his manufacturing career, it should be remarked that he was the recipient of the highest premiums from the Franklin Institute, of Philadelphia, and the American Institute, of New York—gold

medals—one of these being intrinsically worth $400, and diplomas of honor, he having distanced all competitors in his peculiar branch. Beside the new office which he now accepted, and which was tendered him at the instance of the Prison Society, with the approval of the Judges of the Criminal Court of Philadelphia and the Prison Inspectors, he was commissioned by the Governor of the Commonwealth the Official Visitor of all the prisons in the State, and each successive Governor of all political parties has re-commissioned him and aided him in the prosecution of his benevolent purposes. During the twenty-one years he has held this position he has procured the release of over 37,000 prisoners, who had been unnecessarily or improperly confined in prisons, and has been the means not only of preventing undeserved suffering to thousands of persons, but has caused a saving to the tax-payers of the city of at least $400,000, which would otherwise have been expended before disposing of their cases, besides rescuing thousands from degradation and ultimate ruin of body and soul. As early as 1827, he assisted in initiating the movement, which was afterwards successfully introduced into the Constitution of 1838, that abolished life offices in the State of Pennsylvania, and was President of the first county convention of the Reform party having this object in view. He was the first prominent mover in the undertaking to erect the monument to Washington in the square of that name, which progressed so far as to lay the corner-stone, February 22d, 1833, in the centre of said square, where it has since reposed in peace, the money then collected having been invested, by the Society of the Cincinnati, until it shall accumulate to a sufficient sum to complete the undertaking. During his residence in New York, he was instrumental in having the Canadian patriot, McKenzie, released from imprisonment, and assisted him to start a newspaper, in which he ably vindicated the course he had pursued; and so fully did he accomplish it that he ultimately returned to Canada, and was elected to a seat in the very same Parliament which had once offered a reward of $10,000 for his head. The Philadelphia Society for the Employment and Instruction of the Poor was principally founded by the exertions of Mr. Mullen, who served as its President for the period of seven years, and this society, in 1848, erected the House of Industry, on Catharine street, west of Seventh, which was used that same year as a cholera hospital, and in 1862 for the sick and wounded soldiers of the Army of the Potomac. This institution has at various times afforded relief to more than 150,000 persons. In this building is also located the dispensary of which he was the founder and President. He also held the office of President of the Moyamensing Soup Society, which was located in the same building and afforded relief to over 3000 persons daily in the winter season. About this time he annexed to his own business the profession of dentistry and manufacture of artificial teeth. He attended a regular course of medical instruction at the Pennsylvania Medical College. The importance of this fact in the record of his life is to be seen in its results. His professional attainments in this respect led him to become the founder of the Female Medical College at Philadelphia, the first of its kind ever established, and, as its President, had the honor of conferring, at its first commencement, the degree of Doctor of Medicine upon the first class of ladies who ever graduated in a regularly constituted medical college. He is also the founder and President of the first lying-in hospital that was inaugurated and went into operation in the State. This was in connection with the college, and located at (old number) 239 Arch street. He also aided, as one of the committee, in the formation of the first dental college in Pennsylvania. He is an earnest advocate of the temperance cause, and in 1829 organized the first county total abstinence society in the State. He also instituted a temperance school, into which he gathered the young lads of the old district of Moyamensing, and had them taught carefully prepared lessons upon the subject, principally Bible selections; thus making war, at its very source, upon the great evil of intemperance. To specify the amount of good he has accomplished, or all the noble charities in which he has been engaged during his long and eventful career, would far exceed the limits here assigned. It may be stated, however, that he has been and still is a member of forty-four organizations of a useful or benevolent character, chief officer of sixteen and founder of seven. He is a good public speaker, and, it is said, has made, in a single year, upwards of 500 addresses in public assemblies on the subject of temperance and works of benevolence. He has been a prominent member and communicant of the Protestant Episcopal Church since 1836, and is a vestryman of the Church of the Evangelists, in the immediate neighborhood of the House of Industry above referred to. During the War of the Rebellion, he served as Chaplain in Company E, 3d Regiment, Reserve Brigade. He was married, in 1826, to Sarah Ann, daughter of Jeffrey and Agnes Chew, of Philadelphia, and is the father of twelve children, eight sons and four daughters—of whom seven are now living. His

eldest son, Charles, entered the army, and after serving two years and nine months as a member of Company A, 81st Regiment Pennsylvania Volunteers, fell at the battle of the Wilderness, May 12th, 1864. He left a wife and two children. His younger brother, Albert, also entered the service, and was a lieutenant in the 192d Regiment Pennsylvania Volunteers; he served with gallantry at Chambersburg and other places, and remained with his regiment till the close of the war. The life-size statue of William J. Mullen, as recently exhibited in Philadelphia, was made in Rome by the eminent sculptor, A. E. Harnisch, and is carved from a solid block of pure white marble. The editor of the *Evening Bulletin*, in an article alluding to this work, states that "he has never seen a better portrait statue than this. . . . . Though the marble may give way to the ravages of time, to which insatiate power all things on earth must yield, yet the name and character, and the many good deeds of the original of the copy, will endure in imperishable record. It will be said of him, in the language of Shakespeare:

> "'His life was gentle, and the elements
> So mixed in him, that nature might stand up
> And say to all the world—this was a man.'"

HON. JAMES KENNEDY MOORHEAD, whose interest in manufacturing enterprises and whose life labors, contributing in a very marked degree to the development of the resources of and the advancement of industries of a widely varied character in a most important section of the State, entitle him to a place in this work, was born in Dauphin county, Pennsylvania, September 7th, 1806. His father, William Moorhead, came to this country from Ireland, in 1798, and settled in Lancaster county, where he was married to Mrs. Elizabeth Young, whose maiden name was Kennedy; she belonged to the Scotch-Irish family of that name, whose members were well known as early settlers in the Pequea Valley, of that county. In 1806, he purchased and removed to a farm situated on the banks of the Susquehanna, in Halifax township, Dauphin county, where his son James was born. William Moorhead was an enterprising and talented man, and took an active part in the political movements of the day; in 1814, he was appointed by President Madison, Collector of Internal Revenue for the Tenth District of Pennsylvania, fulfilling its duties with marked ability and judgment; in 1815, he removed to Harrisburg, where he died, in 1817. In the following spring, Mrs. Moorhead, with a family of six young children, returned to the farm on the Susquehanna; and on James Kennedy, while in his twelfth year, devolved its management, and also the duties connected with a ferry established by his father, and widely known as the Moorhead Ferry. At the age of sixteen, he was apprenticed to William Linville, of Lancaster county, to learn the art of tanning and currying leather. After the expiration of his term of apprenticeship, he pursued his trade as a journeyman tanner for a short time; and, in 1827, engaged as a contractor on the Susquehanna Division of the Pennsylvania Canal, when he became an ardent advocate of the Internal Improvement system. In 1828, he obtained contracts on the Juniata Division of the above-named canal, and removed to Huntingdon in order to facilitate his business. Upon the completion of his contracts, he was appointed, by the Central Commissioners, Superintendent of the Juniata Division of the Pennsylvania Canal, and held that position until 1838, when he resigned it to take charge of the Pioneer Packet Line, an enterprise established through his instrumentality for the carrying of passengers from Philadelphia to Pittsburgh. This responsible interest necessitated his removal to the latter city, in 1836, where he has since chiefly resided. In the meantime he had become an active, ardent and influential member of the Democratic party, and was recognized as an eminent ally and astute leader. In 1839, he was appointed, by Governor Porter, Adjutant-General of the State of Pennsylvania; and in the summer of 1840 President Van Buren appointed him Postmaster at Pittsburgh, which last office he held until the accession, in 1841, of the Harrison administration. At this date the improvement of the Monongahela river by dams and locks was commenced; to him was awarded the first contract therewith connected, and he became a stockholder in the company. In 1846, he was elected President of the company, and still retains the position after twenty-eight years of continuous service. In the "History of the Company," recently written by a distinguished lawyer of western Pennsylvania, appear the following lines: "It is so obvious as hardly to justify its mention here, that much of this company's success and efficiency is owing to the energy, skill and unceasing vigilance of its President. . . . . Indeed, so completely has he become identified with the 'Slackwater' that it has given to him his most familiar sobriquet, 'Old Slackwater.' To what extent this slackwater navigation of the Monongahela river has contributed to the growth and prosperity of Pittsburgh,

and the development of the great interests in the Valley of the Monongahela, need not be told in western Pennsylvania." In 1840, he established the Union Cotton Factory, in Allegheny City, but in 1849 it was devastated and entirely ruined by fire. From 1849 to 1873, he was largely interested in the Pittsburgh Novelty Works. At an early date he became identified with the telegraph enterprise, and for many years was President of the Atlantic and Ohio Telegraph Company, and of the Pittsburgh, Cincinnati and Louisville Telegraph Company; he was also for a number of years President of the Chartiers Valley Railroad Company. For a long period he served as one of the inspectors of the Western Penitentiary, and has been a director and manager of the Western Pennsylvania Hospital and of the House of Refuge, at Pittsburgh, since their establishment, and still holds a position in the former. To the founding and support of these two institutions he contributed largely, both by pecuniary assistance and personal effort. He is one of the trustees of the Western University, and also one of its most active and efficient upholders. While a member of the Democratic party, he was distinguished for his Anti-Slavery Extension and Protective Tariff doctrines. On the formation of the Republican party, in 1856, his principles and convictions induced him to side with that organization; and in 1858 he was elected a Representative to Congress from the Pittsburgh District, and subsequently was re-elected four times. In 1868, he declined a renomination, and at the end of the Fortieth Congress withdrew from active public life. In the Thirty-sixth Congress, he served on the Committee of Commerce; in the Thirty-seventh, on the Committee of Naval Affairs, and was made Chairman of the Committee of National Armories. In the Thirty-eighth Congress, he was continued on the Committee of Naval Affairs, and appointed Chairman of the Committee on Manufactures. In the Thirty-ninth and Fortieth Congresses, he was a member of the Committee of Ways and Means, while retaining the last-named chairmanship. Throughout his various terms he distinguished himself as a shrewd and brilliant orator, and delivered able speeches on the subjects of the Tariff, Finance, Reconstruction, Impeachment of ex-President Johnson and other engrossing subjects of the day. He possessed, in the highest degree, the respect and confidence of Abraham Lincoln, and of Edwin M. Stanton, Secretary of War, the latter having been for twenty years prior to this time his intimate friend and legal adviser. During the progress of the civil war, he was noted for his untiring and generous attention to the wants and interests of the Pennsylvania soldiers; and ever evinced a fearless loyalty and an inflexible determination to sustain the rights and honor of his State and country. While actively engaged as a contractor, manufacturer, political leader, as President of a Navigation Company, of one Railroad and two Telegraph Companies, he has managed to devote much time and attention to charitable movements and enterprises of a philanthropic nature; and has always been an energetic participant in all movements calculated to advance the welfare of the State and country. His leading traits of character are indomitable energy, strength, talent, and ability; in its tendencies his clear and vigorous intellect is eminently practical, and his nature is aspiring and progressive. He was married, in 1830, to Jane Logan, of Lancaster county, Pennsylvania.

GEORGE J. HENKELS, Manufacturer of Fine Cabinet Ware, Nos. 211-215 South Twelfth street, Philadelphia. The proprietor of this elegant establishment commenced the business, which he has so ably conducted for many years, in 1844, in a building on Spruce street, near Fifth, and two years later removed to Walnut street, near Fifth street. The following year he succeeded to the business established by Crawford Riddell, on Chestnut street, opposite the State House, where he continued for six years. In December, 1854, the building and contents were completely destroyed by fire; when he commenced to rebuild, on the same site, and, in September of the following year, he was once more enabled to carry on his manufactures and dispose of his wares. In July, 1857, he perceived in the commercial world an advancing storm, which culminated in the autumn of that year. In anticipation of the panic which overspread the country, and in order to reduce expenses, he removed to and occupied the premises No. 524 Walnut street. In 1861, and shortly after the outbreak of the Rebellion, and when the issue of Treasury Notes was begun, he believed that business of all kinds would revive and prosper. He accordingly rented the large store known as the Fetridge Building, Nos. 809 and 811 Chestnut street, which had been formerly in the occupancy of L. J. Levy & Co., where he remained until the property was sold to the Bank of the Republic. At this juncture, he removed to the Fotterall Mansion, Nos. 1301 and 1303 Chestnut street, where he remained until the spring of 1875. In the month

of February of that year, an opportunity offering to purchase the property Nos. 211, 213, and 215 South Twelfth street, he availed himself of it, and has become the owner of the excellent buildings thereon erected. The lot has a frontage of 80 feet on Twelfth street, with a depth of 136 feet. This he has fitted up in elegant manner for the display of some of the choicest and most exquisite articles of furniture yet manufactured in this country. The manufactory he carries on with the assistance of his sons, who thoroughly understand the business. As long ago as 1857, he introduced, from Europe, what was there termed the Pompei'n style of furniture—a very light colored walnut, with polished ebony mouldings, creating a very pleasing effect. This style was a specialty of the establishment for many years, and has contributed largely to the extension of the business. The great success attained by the proprietor is due to the fact that he is not only the oldest cabinet-maker engaged in business at the present time in Philadelphia, that is, of those having served their apprenticeship in the city, but also from the fact that he is the designer and draughtsman of every article produced in his workshops. Only the finest and most costly description of furniture is produced, the rarest and choicest varieties of woods are used, and the adornments are classic and unique; the designs betray the master mechanic, while in the manufacture nothing short of perfection is aimed at. Only the most skilful artisans are employed, and the articles produced cannot be surpassed in the country.

GEORGE J. HENKELS was born, 1819, in the city of Philadelphia, and is the son of Peter Daniel and Mary (Snyder) Henkels. His father was a native of Wurtemberg, Germany, and his mother a Philadelphian. During the War of 1812, his father was largely engaged in the manufacture of fire-arms for the United States Government; and with his stepfather erected the first steam factory in Philadelphia, which was situated at the site now known as Fifth street and Germantown avenue. In 1836, George J. Henkels was apprenticed, to learn the cabinet-making business, to John Graham, an extensive manufacturer of fine wares, whom he served for four years. When he attained his majority, he rented a small shop in Harmony Court, where he was wont to labor night and day, in order to get a fair start in the world. Having been enabled by this novitiate, which extended through four years of his early manhood, aided by the practice of the strictest economy, and his habits of sobriety and industry, to accumulate a capital of $400, he commenced business on his own account, in 1844.

COLUMBIA FLOUR MILLS, George Bogle, Proprietor, Columbia. This site has been occupied as a Grist Mill for over a century. Wheat was ground here for General Braddock's army, during his memorable campaign, which ended in his defeat and death. It would be difficult to obtain a correct history of the mill; but it has been in the possession, at various times, of a number of old families—the Puseys, the Haldemans, the Stricklers, etc. In 1866, George Bogle, Samuel Shoch, and Joseph Wilson—the latter of West Chester—rented it for three years. At the end of that period, George Bogle purchased the property, and ever since has operated it successfully. Flour, corn meal, and chop feed are the products.

GEORGE BOGLE was born, 1816, in Columbia, Pennsylvania, where also he was educated, and it has been his only residence. He learned the trade of a cabinet-maker, but did not follow it as a calling. In 1842, he engaged in the lumber business, in which he continued for thirty years. He is President of the Columbia National Bank, and also of the Susquehanna Iron Company. In political opinions, he is a Republican, having previously been an old line Whig. He has served three terms as a member of the Town Council, and continues to take much interest in local affairs. He is thoroughly devoted to the welfare of his native town, and has never been absent from it a month during his life.

SUSQUEHANNA IRON COMPANY, George Bogle, President; William Patton, Treasurer; Columbia, Lancaster county. This company was established in 1864, and was organized by Isaiah Richards, George Bogle, Jeremiah G. Hess, Christian S. Kauffman, Matthew Stickle, Robert Crane, Ephraim Hersley, and Philip Gossler. All these excepting the last named are yet living. Isaiah Richards was the first Superintendent. He claimed to have an improved process for the manufacture of bar-iron, but it never worked successfully. George Bogle was elected President, and has continued in that position to the present time. Shortly after the company was formed a charter was procured and stock issued. This step was the

cause of Philip Gossler abandoning the concern. Various changes have occurred in the parties composing the proprietors; and of those originally interested in the enterprise but two remain. These are the President, George Bogle, and Robert Crane. The other members composing the company at this date (1875) are William Patton, Treasurer, Michael Schall, John Payne, Edward Edwards, and Andrew Garber. The capital stock is $100,000, all paid in. For some years the concern did not prosper, but eventually achieved success. About 200 hands are employed, and the amount of wages paid is over $100,000 yearly. Twelve thousand tons of coal are annually consumed, and 6000 tons of manufactured iron are turned out during the same period. When working to full capacity, double this amount can be produced. The railroad freight chargeable to the company amounts to $55,000 per year; and the value of products is $600,000 per annum. During the year which followed the commercial panic of September, 1873, the company continued in operation, when other mills all over the country were closing their doors, and sending their unfortunate employés adrift. The bar-iron made by the company is of a very superior quality, and received the silver medal from the Franklin Institute, of Philadelphia, at their Exhibition held in Philadelphia, November, 1874. In order to show the marvellous toughness and solidity of the material, pieces of flat bar-iron had to be first cut before they could be bent and torn open.

ROSENGARTEN & SONS' CHEMICAL LABORATORY, No. 1700 Fitzwater street, Philadelphia. This house was founded, in 1821, by the present senior partner, who then was a member of the firm of Rosengarten & Zeitler, who carried on the business until 1823, when the latter withdrew. The remaining partner, George D. Rosengarten, continued the operations of the laboratory on his individual account until 1845, when he associated with him N. F. H. Denis (who had been a pupil of Robequet of Paris), and this firm conducted operations until 1855, when the junior member retired. Subsequently, the proprietor associated with him his sons, Samuel G., Mitchell G., Harry B., Adolph G., and Frank H. Rosengarten, under the firm-name of Rosengarten & Sons. The works were originally located in St. John street, where they remained for three years, and were removed, in 1824, to a property on Arch west of Twelfth street. In 1831, the laboratory was changed to Broad above Vine, and five years later, to Vine and Sixteenth streets. In 1856, the present site was selected as the most favorable for the extensive operations of the house, affording the benefits to be derived in being the possessors of an entire square of ground, bounded by Fitzwater, Seventeenth, Catharine, and Eighteenth streets. The present laboratory is one of the most important in the United States. Its products are the finer chemicals, and especially the sulphates of quinia, and other alkaloids of cinchona barks, morphia, and various other vegetable alkaloids. To the purity and superior manufacture of the latter, the house attribute the great success they have attained during the many years they have pursued their profession. At the Semi-Centennial Exhibition of the Franklin Institute, held November, 1874, the firm were the recipients of the silver medal, the highest prize awarded, the judges being professional chemists, and stating that the productions were certainly the best of the kind in the market, and fully sustaining the reputation enjoyed for so long a period by this old-established house. The senior partner had just arrived at manhood when the business originated, and he still remains at the head of the concern, now in its fifty-fifth year of existence.

KEYSTONE PORTABLE FORGE COMPANY, 120 Exchange place, Philadelphia. This business was established, in November, 1871, to manufacture the Portable Forge with Fan Blast and Tubular Iron Legs—an entirely novel contrivance in its character and capacity, which had been invented in that year by D. W. C. Baxter. An interest in the invention, which had been patented, was purchased by C. Forbes, and with W. T. Forbes as business manager, the company commenced operations. The first forge completed was of small size for very light work. In 1873, C. C. Torr was admitted to the firm, and their capital was largely increased to meet the demands of a trade which, in two years, had reached throughout the United States and Canadas. At the present time the firm are the most extensive manufacturers of portable forges in the world. Having obtained letters patent, not only from the United States, but also in Great Britain, France, and Belgium, their foreign trade is quite as large as the home trade. They export their goods to England and the Continent, to the West Indies, Mexico, South America, China, Japan, Australia, and have recently

filled orders from the island of Java. Great Britain is their leading foreign market. Both the United States and British navies are supplied by this company, and their customers represent over 200 different avocations. Although established but three and a half years, their catalogue embraces more than fifty different styles and sizes of portable forges, which are adapted to every class of work from three-quarter inch to eight inch iron; also for melting, refining, etc. Whenever the firm find a demand for a new style or modification of one already made to meet the wants of workers in metals, it is added to their list. The company is largely represented by agents in every important city in America and abroad.

WILLIAM HOLZER, Manufacturer of Druggists', Chemists', and Philosophical Glass Ware, Philadelphia. William Holzer is a son of Jacob Holzer, and was born in Philadelphia, June 27th, 1844. He received his education at the public schools till fifteen years old, when he entered the establishment of Gustavus Storm, manufacturer of druggists' glass ware, 633 Market street. In this manufactory he served his time, and shortly after attaining the age of twenty-one, commenced business for himself on one floor of a building situated on Market street above Fourth, where he employed ten hands. But soon finding that a larger workshop was necessary, he removed to Minor street above Fifth. Here the value of the produce during the first year amounted to about $15,000. This was followed by eight years of steady growth, during which the trade extended itself all over the United States, and eventually became so large as to need still more extensive premises. Accordingly, in 1874, a removal was made to the building at present occupied, No. 1128 Market street. The workshops are on three floors, having a frontage of 18, and a depth of 66 feet. All the work is done by means of the blow-pipe, and thirty hands are employed, composed almost entirely of men who have served an apprenticeship in the establishment. Consequently a high degree of skill is brought to bear on the manufacture; and this, added to the large experience and practical knowledge of the proprietor, is producing results the most satisfactory. Philadelphia has never before possessed an establishment combining the manufacture of so many different branches; for in this one manufactory is produced every class of glass ware used for surgical, chemical, and philosophical purposes. In addition to a large trade through the country, the goods are extensively exported to Canada, and shipments are occasionally made to Cuba. But, notwithstanding the large results, the concern may be regarded as yet in its infancy, the proprietor being still a young man. Just now he is engaged in making arrangements by which he hopes very soon to see the trade almost doubled.

CHARLES BRINTZINGHOFFER, Brush Manufacturer, Philadelphia. This house was established in 1842, at its present location, 935 Market street. During the long period of its existence—a third of a century—it has become known for the good quality of its productions more than for their great extent, although the trade done by it is by no means small. Every kind of brush—excepting only artists' brushes—is manufactured here, from the rough broom of rattan or whalebone up to the softest fancy brush, made from carefully-selected hair, or finest French bristles. The main supply of bristles for brush manufacture is obtained from the hog, and is imported from Europe; the largest proportion coming from Russia, and the finest kind of white bristles from France. They are classified according to the degree of fineness, the length, and the color—white, black, or gray. Some few coarse brushes are made of cocoa fibre, and are of a dark brown color, and a large quantity of common, cheap brushes are made of Tampico hemp, imported from South America. The bristles are received by the brush manufacturer from the importer, prepared and sorted according to the quality, and bound in small bundles. Before the actual manufacture commences, however, they have to be "combed" and "dragged." The "comb" is of steel, with long teeth, and is fixed on a bench. The bristles are passed repeatedly through these, and thus the wool is removed and the color mixed. The "dragging" is simply the pulling out of a bundle, by hand, those bristles which are not the required length, and thus making the length uniform. In making some kinds of brushes the bunches of bristles are dipped or "set" into pitch, and inserted into holes cut in the wood of the back; but in the majority of cases the bristles are fastened with wire, which is formed into a loop, and passed through the holes of the back. The bristles are passed through this loop and doubled, and the wire is then drawn back, bringing the bristles into the hole. This process is repeated until all the holes are filled, when the wire is secured. The bristles are cut into various lengths, according to the kind

of brush to be made, and the short ends are thrown away as refuse. The waste wool is sold to harness makers to be used for stuffing horse collars. A specialty of this establishment is the "leather back horse brush," which was invented by Charles Brintzinghoffer, in 1852. The back of this brush is made of heavy sole leather, surmounted by an outside back of patent leather. This makes an extremely strong brush, which is very popular. Another invention produced by this establishment is the "portable shoe brush," which was patented in 1871. The handle of this brush is removable, and the brush, together with a small box of blacking, fits into a little box 6½ by 4½ inches in size, and is very convenient for travellers and tourists. The Franklin Institute of Philadelphia awarded a medal to this house for these two inventions.

CHARLES BRINTZINGHOFFER was born in Philadelphia in 1811, and learned the brush-making trade with Myers Busch. In 1840, he started business in partnership with W. H. Korn, and in 1842, established the house at 935 Market street on his own account.

WARRINGTON STEEL PEN COMPANY, Philadelphia. This establishment was started in 1865, as a private firm, by Samuel Warrington, John Turner, Joseph Truman, and Edward Smith, at its present location at Twelfth and Buttonwood streets. All the four men were practical workmen, thoroughly conversant with every detail of the steel pen making trade, having learned it at the famous works of Joseph Gillott, in Birmingham, England. Notwithstanding the powerful competition of the English products, the undertaking was successful, and in 1870, the house was incorporated into a joint stock company under the above-mentioned style, being—as they still (1875) are—the only steel pen manufactory in the whole State of Pennsylvania. The factory is a brick building 50 by 125 feet, and five stories high. The machinery necessary for the work was all made in Philadelphia, under the personal direction of the founders of the business. The engine used is of forty-five horse power. The number of hands employed is 100. The finest Sheffield steel, imported by Jessup & Son, is the only steel used, and the quantity consumed in the manufacture is about twelve tons per annum. The goods made include every known style of steel and composition pen and pen-holder, many of which are of their own invention. The most important of these is the "treaty pen," made to represent the action of the gold pen, and patented July 24th, 1866. Their price list quotes about 100 different kinds of pens, and the annual production is 150,000 gross, which is distributed to all parts of the country. The manufacture of steel pens dates, in England, from 1803, and in the United States from 1810, in which year a patent for metallic writing pens was granted to Peregrine Williamson of Baltimore. The well-known Joseph Gillott began the making of steel pens about 1822, and used improved machinery for the purpose. The manufacture rapidly extended and improved from this date, and an infinite variety of styles and sizes were made. The holders also were made in as great variety as the pens, some of them being hollow and designed to hold a supply of ink for continuous writing, or what is commonly known as the "fountain pen," of which this firm make large quantities. The processes of manufacture of steel pens are many and complicated, and require constant careful supervision. The first step is the punching of the blanks from thin sheets of the metal. The hole which terminates the slit and gives flexibility to the pen is next punched in the blanks. They are then annealed by being put into two iron boxes, one inside the other, which are made air-tight and put into a furnace, where they are kept for twelve hours; and after this the proper curvature is given by means of dies. The half-made pens are then hardened by being again enclosed in strong iron boxes, containing about fifteen gross each, and put into the furnace, where they are then kept until the proper heat is obtained. When taken from the furnace the second time they are plunged into oil, after which they are cleaned by being revolved in a drum containing sawdust. They are then tempered by revolving in a cylinder over a slow fire, and after that they are "rough polished" by again revolving in the drum. The nibs are ground on emery wheels, and the slit is made in a press, the machinery of which is very delicate. They are next examined closely in order to reject any which may be imperfect, and afterwards "fine polished" by being placed in the drum for the third time, in which they are then kept constantly revolving for three days. The last operation of the manufacture is the coloring blue or brown, as may be required; after which they are finally sent to the packing room to be prepared for the market. The work is done almost entirely by machinery, and such hand processes as grinding the nibs—which is done by girls—are performed with the greatest rapidity. Steel pens of every pattern, some of them being of a most superior kind, are everywhere as common

and nearly as cheap as pins. The present officers of the company are: John Turner, President; Robert N. Willian, Treasurer; and James Warrington, Secretary.

LEBANON MANUFACTURING COMPANY, E. A. Uhler, President; J. M. Gettel, Superintendent, Lebanon. This enterprise was organized, in 1867, under a charter of the State Legislature. The original capital paid in was $20,000, by twenty stockholders, and C. D. Gloninger was the first President, with E. A. Uhler (now President) as Treasurer. J. M. Gettel has been the only Superintendent of the company, still retaining that position. The works are located at the corner of Tenth street and Lebanon Valley Railroad. The first articles manufactured were agricultural implements, and this branch they abandoned in 1871. Prior to that date, however (in 1869), they had engaged in building of freight and coal cars, and have turned out in one week forty-eight eight-wheel cars. Special attention is paid to machinery and appliances for furnaces. Both stationary and portable engines are likewise built. In January, 1873, the works were almost totally destroyed by fire, but were immediately rebuilt. The number of stockholders has only increased by one; but the capital has been from time to time augmented, and is now in the neighborhood of $100,000. The company own four acres of ground, nearly half of which is under roof. In the busy season from 300 to 400 hands are employed. It is a difficult matter to average the value of articles manufactured yearly. They have, however, reached $120,000 in a single month.

YORK MANUFACTURING COMPANY, S. M. Smith, President; J. Loucks, Secretary, York. This company was organized in the fall of 1874, having been chartered by the State Legislature. Prior to that date, the President, S. M. Smith, had been engaged in the manufacture of the "Success" Washing Machine—an invention of his own. About 6000 of these articles had been made and sold—value $150,000. They have been disposed of in all parts of the world—in the United States, Canada, South America, Europe, and even Asia. The company was organized by its President for the purpose of extending the manufacture of the "Success Washer," and also for making the "Success Wringer," the combined invention of S. M. Smith and Leander Becker, who is interested in the company. The "Bollinger Turbine Water Wheel," invented by O. J. Bollinger, of York, is also one of the productions of the company. The buildings owned and occupied by the company have a front of 65 feet on Penn street, near Main street, with a depth of 200 feet. The buildings, machinery, and ground are valued at $25,000. There are about fifty hands employed on the premises, and beside the above-named specialties, a variety of mill and domestic machinery is also manufactured. Since the date of the organization the company has progressed rapidly, and the works are running to their fullest capacity. Extensive improvements are already in contemplation, including the erection of a foundry.

STEPHEN MORGAN SMITH, President, was born, 1838, in the western part of the State of North Carolina. He was principally educated in the Moravian school of Bethlehem, Pennsylvania, and studied for, and was ordained to, the ministry of the Moravian Church. He continued in that calling for ten years, but was obliged to relinquish it by reason of losing his voice. He is possessed of considerable mechanical genius, which he has already turned to good account; having, in October, 1870, patented his "Success Washer." For some years they were manufactured in Ohio, the inventor receiving therefor a royalty. He was eventually induced to undertake their manufacture himself, and selected York as a convenient location, he having preached there for several years. He occasionally preaches at the present time in the various denominational pulpits there. He takes a deep interest in public affairs, and is President of the Town Council, and Secretary of the York Haven Manufacturing Company, at Conewago Falls, ten miles distant from York.

JACOB LOUCKS, Secretary, was born, 1828, near York, Pennsylvania. He was educated in the common schools of that section, and passed his younger days on a farm. He learned the business of a paper manufacturer, which he carried on for fifteen years in Baltimore county, Maryland. He is also a farmer, and still pursues that calling to some extent. He has been for several years a Director in the First National Bank of York. He is a zealous member of the Methodist Episcopal Church.

HOOPES & TOWNSEND, Manufacturers of Bolts, Nuts, Rivets, Wood-Screws, Washers, Chain-Links, etc., Philadelphia. This business was originated at Wilmington, Delaware, by the senior partner, Barton Hoopes, in the year 1849. Early in the year 1850, he associated himself in partnership with S. Sharpless Townsend, and the style of the firm became Hoopes & Townsend, by which it is still (1875) known. In July, 1852, the machinery and plant was removed to Philadelphia, and at the same time Edward Hoopes became a member of the firm. The premises first occupied by the manufactory in Philadelphia were at 1330 Buttonwood street, the extent of the buildings being then 40 by 115 feet. The business has increased so much since that time that the works now cover an area of more than six-fold that of the original factory, viz., 258 by 115 feet. Until within comparatively a few years the several articles manufactured at this establishment were always made by hand; but the consumption having increased very considerably, in consequence of the multiplicity of railways, mines, etc., it became necessary to devise means to furnish them in a more expeditious manner and at cheaper rates; and this firm was among the earliest to supply the wants of railroad companies, machinists, car builders, bridge builders, and others, in this direction; the articles of their manufacture being peculiarly adapted to their several purposes in point of strength, durability and finish. The greater uniformity which is attained in their machine-made goods gives them a great advantage over hand-made work; and this, together with the superior character of the material used, which is made expressly for the firm, puts their productions far in advance of Eastern manufactures. The trade of this house is chiefly confined to bolts, nuts, rivets, washers, and wood-screws; but they have also executed large contracts for iron-work for the construction of bridges, cars, and buildings, and have devoted much attention to the manufacture of punched chain-links and chain for ice elevators, sugar refineries, etc. The experience gained during a quarter of a century in this department of production has placed these works in an unrivalled position, their facilities being second to none in the country. The operations of the house are of no small extent, as may be shown by the fact that, on an average, fifteen tons of iron are daily used and made into these small but valuable and important articles, requiring nearly two thousand tons of coal per annum. The market value of the production amounts to about one million dollars yearly. The business is not confined to local and domestic trade, but their manufactures are shipped to Cuba, South America, and China. The manufacturing department is under the management of the founder of the works, Barton Hoopes, while S. Sharpless Townsend devotes his attention to the construction and improvement of the machinery used in the establishment; the financial affairs of the firm are superintended by Edward Hoopes, and the general business manager is James M. Hibbs, who has been employed by this house for nearly twenty years. The results obtained by this firm, by close attention to detail, in the manufacture of these articles are an interesting study, and have attracted much notice in both business and scientific circles. Their cold iron punching especially has been the subject of remark, and has caused considerable discussion among those concerned in this line of manufactures. In order to exhibit this punching the firm have turned out a number of sample nuts, neatly nickel-plated and stamped with their name and with the names of the principal articles made by them, and have distributed large quantities of them as specimens throughout the country. This nut is hexagon-shaped, one and three-quarters of an inch in thickness, punched with a punch seven-sixteenths of an inch in diameter. The great disparity between the thickness of the iron punched and the diameter of the punch would seem to be insurmountable, as the rule has been heretofore that the maximum thickness of iron that can be punched cold is about the diameter of the punch; yet, as seen by these samples, this firm have succeeded in punching cold iron four times the thickness of the diameter of the punch. A long address delivered to the Franklin Institute on this subject by Coleman Sellers concludes as follows: "I should state that one of these sample nuts, with a three-eighth inch hole through one and a quarter inch iron, was to-day planed in half lengthwise of the hole. I then etched the surfaces with acid to expose the grain. It seems as if the point had penetrated one quarter inch without causing much side condensation of the metal; after that the compression seems to be uniform. The metal punched out shows the usually scaly appearance of deep iron punchings, or as if one part was crushed over the other, the projecting edges being full to size and burnished. The holes in the nuts are smooth and polished. I cannot help thinking that these are noteworthy examples of cold punching." Thoughtful men have in times past discarded nuts made in this manner, giving the reason that the resistance offered by the iron on being punched while cold had a tendency to loosen or separate the fibres, and thus produce a nut less capable of enduring a se-

Powers & Weightman, Manufacturing Chemists. Philadelphia

vere strain than one manufactured from a heated bar. At first sight this would seem plausible, but a close scrutiny into facts will show that this is not the case. It must be understood primarily that the first and indispensable requisite is good iron, as none other can be punched cold successfully. Inferior iron that would work well into hot-pressed nuts invariably breaks in half on being subjected to the test of cold punching. Thus one fact is clearly demonstrated, viz.: that a cold-punched nut is of necessity made of good iron. Another advantage it possesses over a hot-pressed one is that there is no "scale" in the hole. This "scale" is caused by the cooling of the heated surface, and is very severe on taps, being extremely hard. Nor is this the only injury done to the nut by heating, as on penetrating this scale the iron is found to be very soft; which, in connection with the poor quality of iron generally used, renders the nut easily "stripped" off the bolt on being subjected to a strain, the thread curling and breaking off without calling into play the strength of the bolt. On the other hand, a cold-punched nut of only one-half the thickness usually used on a bolt of a given diameter, will, on being subjected to a breaking strain, break the bolt without injury to the nut or the thread in the nut. The result of subjecting to a breaking strain a nut only three-eighths of an inch thick placed on a bolt made of good iron three-quarters of an inch in diameter will clearly prove this. The same minute care and attention which has been given by this firm to the matter of cold-punched iron is also extended to every article made by them. Their success in cutting threads on bolts is also noteworthy, nuts tapped of any given diameter always being interchangeable and fitting neatly the bolts of that diameter. Their railroad track bolts are cut and fitted with nuts so perfect in fit of threads that the nut on being screwed up on the bolt with a wrench is warranted not to jar off by the action of passing trains, thus dispensing with the thousand and one expensive lock-nut arrangements for this purpose.

POWERS & WEIGHTMAN, Manufacturing Chemists, Philadelphia. This firm, consisting of Thomas Henry Powers and William Weightman, are the successors to the business of Farr & Kunzi, which was first established in Philadelphia in the year 1818. Abram Kunzi was a native of Switzerland, and had been educated as an apothecary in a country where all the apprentices are taught pharmaceutical chemistry and practised in making most of the officinal chemicals. He worked for some time with John Harrison, and then with S. Wetherill & Son. He soon, however, entered into partnership with John Farr, a young Englishman who had served in one of the best retail drug stores in London. Abram Kunzi was a man of much practical skill, and John Farr had mercantile enterprise and experience; their business was conducted with fair dealing and integrity and was eminently successful. The circumstances of the times also favored them, and enabled them to lay the foundations of a business which has developed into one of the most extensive chemical works in America or perhaps in the world. The war with Great Britain in 1812, and the commercial restrictions which preceded it, had caused such a scarcity and dearness of chemicals that numbers attempted the preparation of the more prominent articles, and the establishment of the chemical manufacturing business in the United States dates from this period. Many of these works were undertaken by foreigners who had learned something of chemical manipulations in foreign factories, or by capitalists among our own druggists who made use of foreign skill, or pretensions to skill, in getting their works into operation. The firm of Farr & Kunzi erected the second leaden chamber of which there is any account as having been used in this country for the manufacture of sulphuric acid. It was of small dimensions, and they concentrated their acid in glass. Their first laboratory was situated on the north side of Arch street west of Twelfth street, but in 1819 they removed to the south side of Coates street above Fourth street. This place was in turn left in 1839, and they then removed their works to the present location at Ninth and Parrish streets, part of which was owned by them as early as 1822. Abram Kunzi retired from business in 1836, and on January 1st, 1838, John Farr associated the present partners with him in the business under the style of John Farr & Co. Three years afterwards (1841) the name of the firm became Farr, Powers & Weightman. The senior partner, John Farr, died in 1847, and, upon his decease, the firm style was changed to Powers & Weightman, as it is at present (1875). About the time of the decease of John Farr the works at the Falls of Schuylkill were commenced. The present firm now own about seventy acres of land in the neighborhood of the falls, twelve of which are occupied by their chemical works. At their factories here are manufactured sulphuric, nitric, muriatic, tartaric, and citric acids; alum, epsom salt, blue vitriol, iron, magnesia, etc., all on a large scale. The works at Ninth and Parrish streets are

also very extensive, and consist of four buildings. The first and largest, in which the offices are situated, occupies half a square of ground, and extends 190 by 360 feet, and is five stories high. The next, which is used as a warehouse, is 80 by 100 feet, and three stories high. The third, also used as a warehouse, is a square building 110 by 110 feet; and there is also another building which is of smaller dimensions. At these city works they manufacture sulphate of quinia, which is their staple article, sulphate of morphia, iodine, and mercurials, and a general assortment of medicinal and photographic chemicals, including most of the officinal chemicals of the British and American Pharmacopœias. This house is now one of the largest among general manufacturing chemists in the world, and its reputation is unsurpassed, both for the purity and beauty of its chemicals, and for the fairness and liberality of its dealings. But few examples are to be found of a chemical establishment which for so long a period—extending considerably over half a century—has sustained so high a reputation in every particular. The firm have an office in New York at 56 Maiden lane.

MILLER & CO., Manufacturers of Parlor and Church Organs, Lebanon. The business was established, in 1872, by A. B. Miller, for the manufacture of parlor and church organs of the various cabinet styles and sizes. He commenced operations in a very small way, having built the first instrument while following his avocation of a farmer, for his own use—a single reed five octave organ. It proved a success, was much admired, and he was induced to construct one for a neighbor. Other orders followed, and he was induced to give up farming. He erected a small shop 12 by 14 feet, near the present manufactory, and one story high. He soon discovered that it was too circumscribed for his increasing business, and he enlarged it. In October, 1873, A. H. Miller—no relative—became a partner, and the production of organs increased materially, beside being considerably improved in quality. The building again proved too small, and was enlarged to the present dimensions—70 by 28 feet, located at the corner of Eighth and Maple streets; the lot measuring 150 by 75 feet. The proprietors are both practical mechanics: A. B. Miller builds the action, and A. H. Miller devotes the principal portion of his time to the tuning. In six months the firm have constructed over 100 instruments, and the demand has been even greater than the supply. The firm are constantly increasing their capacity, and are fully justified in every step taken in this direction.

ADAM B. MILLER was born, 1848, in North Lebanon township, Lebanon county, Pennsylvania, and is the son of a carpenter. He has followed various pursuits, being led into them by his strong mechanical genius. From boyhood up he has been experimenting in the manufacture of reeds and musical instruments of different kinds, mostly of his own inventive fancy. At the time he built his first organ he never had any access or insight into an organ manufactory, but was guided solely by his own intuition.

ABRAHAM H. MILLER was born, 1845, in North Auville township, same county and State. He passed his boyhood on a farm. He had a great taste for music, and made considerable progress as an organist. For several years he was teacher in a common school, and was subsequently engaged in a hardware store, which he relinquished when he accepted the proposition of a partnership tendered him by A. B. Miller. He has since devoted all his attention to the business.

YORK SHOE MANUFACTORY, C. E. Lewis, Proprietor, York. This establishment was founded, January 1st, 1871, by Rush W. and Clay E. Lewis, constituting the firm of Lewis Brothers, which continued until the death of the former, in the spring of 1874, since which period the latter has been sole proprietor. At first the factory was located on the borough line and New Salem road, where twenty hands were employed, and shoes to the value of $33,000 produced. The force, however, was continually being increased, and at the end of the first year there were thirty-five hands at work. In September, 1873, the firm removed to the corner of Penn and West Market streets, to a handsome building erected by Samuel Smyser, an extensive real estate speculator of the town, and who is a brother-in-law of the present proprietor. The building measures 90 by 30 feet, two stories high, with a basement. The manufactures comprise ladies', misses', and children's boots, shoes, and slippers. Between sixty and seventy hands are employed, turning out goods to the value of over $80,000 yearly, which find a market in Baltimore, Pennsylvania, Ohio, Indiana, Illinois, and Michigan. About one-fourth of those made are sold in

the town. A retail store, connected with the factory, was established in Lancaster in the fall of 1874. The goods give great satisfaction, as is evidenced by the local sales made.

RUSH WEBSTER LEWIS was born in 1828, in Dover, York county, Pennsylvania. He only had a common school education, but was a man of strong intellect. He learned the trade of whip maker, but never followed it, entering a store as clerk. While young he travelled a good deal, and was in several cities and towns, employed in various mercantile houses. He learned shoe cutting, at Lynn, Massachusetts, in 1865, and then became salesman for the same manufactory there. Subsequently the proprietor engaged him to travel in the West, where he had a large business acquaintance. He returned to his native place in 1870, and soon after became interested in shoe manufacture. He died in May, 1874.

CLAY ELI LEWIS was born in Dover, April 5th, 1844. He attended common school until his eighteenth year, and then entered the York County Academy. He subsequently went to Philadelphia, where he acted for six months as clerk in the Merchants' Hotel. On his return he held the position of an assistant teacher in the academy for one term. He next visited New England, and was employed in a shoe factory there. Eventually he returned home with the intention of studying law; but being tendered a position as clerk in the First National Bank, York, of which his uncle, Eli Lewis, was President, accepted the same. After being there one year he was elected teller, which position he held until he engaged in his present business.

REINOEHL & MEILY'S PLANING MILLS AND LUMBER TRADE, Lebanon. This business was established, in 1829, by Samuel Reinoehl of Lebanon, and Henry Smith of Middletown, who entered into partnership for the purpose of conducting both the coal and lumber traffic, at the same place now occupied by the firm of Reinoehl & Meily, on North Ninth street and the Union Canal. By the completion of the latter improvement, in 1828, all timber, which previously had been received at this point, was brought by teams from Middletown and from the banks of the Swatara. At first the enterprise was a small one, and up to 1857, the business of distributing the lumber throughout the town was done with one horse, when—the trade increasing—another was added. Some years after the firm had been established, and at different times, George Reinoehl, Jefferson Shirk, and George Mark were associated with Samuel Reinoehl. Subsequently the senior partner admitted his son Adolphus and Charles H. Meily into business relations with him, and these continued as a firm until 1865, when the senior member retired, and the present firm, as constituted, have since continued the concern, having secured enough capital and credit to expand operations very materially. In that year, in connection with E. & J. McCreary, of Middletown—each firm representing a one-half interest—they erected a saw-mill at that place, with the capacity of sawing 8000 feet of square timber daily. This business was conducted steadily until July, 1873, when it was destroyed by fire. With characteristic energy and courage, another mill was at once erected, 80 feet long and 40 feet wide, two stories high, with iron roof, and a capacity for sawing from 25,000 to 30,000 feet of building timber a day, and had it in operation on the first of the following November. On the first floor of this mill shingles, paling, and lath are made, and the upper story contains a six-feet circular saw, a muley and gang saws. A sixty horse power engine drives the machinery, and from twenty to thirty hands are regularly employed. The timber is purchased from first hands at and above Lock Haven, whence it is floated down the Susquehanna to the mill, and received into a large basin communicating with two dry docks, where it is stored and seasoned. This establishment covers fourteen acres of ground and water. The lumber is now transported to Lebanon *via* the Union Canal, and so reaches their yard in that town. Here the firm have erected a planing mill, 70 feet long and 40 feet wide, three stories high. The upper story, which is of the same dimensions and 20 feet high, includes an open loft for drying the wood before keying. This shop contains a large tennon machine, a grooving or plowing saw, one panel raiser machine of the best make, one combination saw table machine, one blind steel borer, one blind slat tennoning machine, one sash dovetail and shaping machine, one steam-power and one foot-power mortising machine, one No. 2 moulding machine, one gig saw, one door clamp, one relishing machine, one sand paper machine, and one large grindstone. In this department all kinds of carving for cabinet-makers' use and house carving is done, requiring twelve working benches. Steady employment is given to fourteen men. The lower shop, also 70 by 40 feet, has in use a No. 1 moulding machine for heavy mouldings and casings, one

combination saw-table machine, one re-sawing machine, one combination planer, one rip saw, one cross-cut saw. All of this machinery is used for heavy work, and employs eight men. All the filing and setting of saws is done by the operators in a small room on this floor, thoroughly adapted for the purpose, and provided with four emery stones and a saw-set machine. The engine room is of brick, 26 by 12 feet, with a tin roof, and contains a new sixty horse power engine. Over this is a room where all the lumber used for casing, etc., is dried. The boiler room adjoins the engine room, and is 18 by 11 feet, with a brick floor and tin roof. It is separated by an iron door from the shaving house, which is a fire-proof brick structure 22 feet square and 25 feet high. It serves as a deposit for the great mass of shavings and saw-dust of the establishment. The turning room is on the first floor, and covers nearly the entire building. It contains two turning lathes, two power grindstones, one cross-cut saw, and one rip saw. George W. Hoffman—a first-class mechanic—has the supervision of this department. East of the mill, and connected with it by the upper shops of each, by a bridge 50 feet long, is the storage house—a two story frame building 44 by 30 feet—which contains the finished work of the establishment. There are two sheds, one on each side of the mill, and adjoining the lower shop, each 42 by 20 feet, used for the reception and storage of lumber; a large frame shed 20 by 18 feet for storage of finished mouldings. There are also three other large sheds used for storage of lumber. The establishment covers four and one-half squares or blocks, employing a large number of men and three two-horse teams. The contrast between the business and capital invested at the present time, and that of its inception forty-six years ago, is a marked one, and is due entirely to the industry, energy and integrity of the proprietors.

ADOLPHUS REINOEHL was born, 1830, in Lebanon, Pennsylvania, and was educated there. He learned the trade of coach-smith and blacksmith, but did not pursue it for any length of time. In politics he was a Whig, and since the dissolution of that party has been a Republican. He has held many minor offices in the county, including the Prothonotaryship of the Court of Common Pleas, and was at one time Burgess of the Borough of North Lebanon. After the consolidation of the two boroughs he was elected the first Chief Burgess of Lebanon. Under his administration the water works for the town were constructed and put in operation. He is a Director of the Lebanon Manufacturing Company, of the Lebanon Transportation Company, and of the North Lebanon Savings Bank, and Vice-President of the Lebanon Building Association. He was one of the founders of the Mount Lebanon Cemetery Company, and is one of the Directors of that corporation. His record shows that he has ever taken an active interest in local affairs.

CHARLES H. MEILY was born, 1827, in Lebanon, where he was also educated. From boyhood he followed mercantile pursuits. In political faith he is a Democrat. He was a member of the School Board of Lebanon for sixteen years. He is a stockholder in the Lebanon Manufacturing Company.

WILLIAM BURWELL & BROTHER, Manufacturers of Fine Carriage Mountings, and Close-Plated and Electro-Silver-Plated and Gilded Work, Philadelphia. This house was established, in 1855, by Matthias Seddinger and William Burwell, under the style of Seddinger & Burwell. The business at first consisted in plating bands, dash-rails, handles, axle and joint nuts, etc., for carriage makers. The senior partner died in 1865, and from that time until 1872, William Burwell carried on the business alone. In February, 1872, George Burwell was admitted into partnership with his brother, and the firm-name was changed to William Burwell & Brother. Since his becoming a member of the firm, George Burwell has had the entire charge of the business. About the year 1866, the use of plating on carriages decreased, and the firm then added to their business the manufacture of fine carriage mountings, silver-plated, oroide, and gilded. They made a specialty, from the commencement, of the finest class of goods only, never making any inferior work except under special order. To distinguish clearly between first-class goods made for their regular trade, and common work manufactured for individual customers, they mark the firm-name on every piece of the former, which they refuse to do with articles of a lower grade. This scrupulous regard to quality has gained for them a very high reputation, and has been a material element in their success. They make and furnish all the small details required by carriage builders, but their special productions are confined to "carriage mountings," such as pole-crabs, shaft-tips, handles, park-bands, hub-caps, buckles, rivets, etc., all which they turn out in infinite variety. They have also given especial atten-

tion to the manufacture of carriage-name plates for the trade, of which article they make about 1000 dozen per annum, and which they supply to regular customers in every State of the Union, from New York and Pennsylvania to California. They have recently (1874) added further to their business the manufacture of silver-plated table ware, confining themselves in this branch also to the production exclusively of superior goods. Their batteries for electro-plating are of very large capacity and are built upon their own especial plan. The solutions of gold and silver are kept in tubs large enough to contain any work which may be brought in. One hundred pennyweights of fine gold are reduced to a liquid at one time for the gold solution, and for the silver solution twenty-five ounces. Positive poles for gilding are composed of platina, and for silver-plating of plates or bars of silver, each plate or bar weighing from four to twenty ounces. After plating, the work is burnished; the silver with fine steel burnishers, and the gold with blood-stone burnishers. All material for re-plating has first to be thoroughly stripped of any silver remaining on it, made bright by buff and emery wheels, scoured and cleaned, before plating, when it undergoes precisely the same processes as new work. The number of hands employed is twenty-seven. Their main factory is at 236 Arch street. Besides their own productions, the firm also deal largely in carriage hardware and trimmings. They were awarded the first premium —a silver medal—at the Franklin Institute Exhibition of 1874 for fine carriage-mountings.

BURD PATTERSON, Coal Operator and Iron-master, was born in Juniata county, Pennsylvania, on July 8th, 1788. He was connected, both on the paternal and maternal sides, with a number of influential and well-known Pennsylvania families, among whom may be mentioned the Birds, Yates, Conynghams, Hubleys and Peales. He received a thorough classical, scientific and English education. In his early manhood he was a Professor of the Latin language at Mt. Airy College, near Philadelphia. He then engaged in manufacturing pursuits, but was, in the year 1826, attracted with other enterprising men to Pottsville, Schuylkill county, where he resided up to the time of his death. To have been a pioneer in the anthracite coal fields, helping to originate and foster a trade so far-reaching in its effects as to be almost at the foundation of the wealth of the Eastern seaboard, is in itself a high honor; and to this honor Burd Patterson was most emphatically entitled. But he was entitled to far more. He was in a most wonderful degree the embodiment of enterprise and progress. When he came to Pottsville he had passed the heyday of youth—he was verging on middle life, having attained his thirty-eighth year. His pecuniary resources were not great, but he had large knowledge of men and things; good character, a mature and broad intellect and keen insight into the future. Proud of his country and its resources, he was anxious for their development. He early engaged in the purchase and sale of town lots in Pottsville and in extending the limits of the then village in the wilderness; indeed up to the time of his death he was connected with much of its improvement and in all the leading enterprises for its development. His character and disposition was, from his youth upwards, essentially that of a leader, and the difficulties which deterred others from entering into new enterprises clothed them to him with a spirit of fascination. In Manayunk, now filled to overflowing with manufactories, he had embarked in the manufacture of wool, and, before his removal to Pottsville, had put up the first spindle that was ever run there. It would be next to impossible to specify all he has done in the development of the coal regions. His mark was made and his influence felt in all directions. Earnest, enthusiastic, untiring and far-seeing, he, not only by individual enterprise but by large personal influence and exertion, induced others to aid in the work of development. In the darkest days of the early history of the coal trade, when many of the boldest of the coal operators faltered, he with undaunted nerve and rational hopefulness made clear the way before them. Understanding and appreciating the necessity of railroad facilities in his work of development, an earnest and effective labor for their extension and increase was co-extensive with his residence in Pottsville; through him old lines of road were extended, and by him new lines originated. But he did not confine himself to Schuylkill county alone. At an early day he commenced the development of the Shamokin Coal Basin, and was instrumental in introducing there the men and the capital who carried out his views. The Ashland Coal Field next commanded his attention, and in connection with the Brocks, of Philadelphia (who were possessed of the requisite capital), he laid out the town of Ashland, and induced the development of a new source of immense wealth. With Dundas, Troutman, Biddle, of Philadelphia, and others, he laid out Mahanoy City. He in-

vested largely in the Mahanoy Coal Field himself, and induced investments on the part of others. What has been effected by these several enterprises can be best appreciated by those who, a few years since, gazed upon an almost unbroken wilderness, and who now see the wilderness replaced by thriving towns and villages, mines and manufactories; a country traversed in all directions by rival railroads and peopled by nearly 100,000 souls. But equally remarkable with his efforts in coal development has been his connection with the manufacture of iron. Few of those who now mark the long line of furnaces in the Lehigh and Schuylkill Valleys, and who with unwondering eyes note the heavy shipments of anthracite coal used in the manufacture of iron, can realize the care and anxiety with which its use for that purpose was introduced. How failure followed failure; how the timid were in utter despair; and how even the sanguine lost faith and heart before success was plucked out of defeat. To Burd Patterson more than any other one man can that success be attributed. He believed, and believed earnestly, that iron could be so manufactured. With him such a belief was tantamount to action. In efforts from which others drew no lesson except that of failure he saw the glimmer of success. Experiment after experiment shook the belief of nearly all except himself, and his influence in that direction was almost powerless, as, after repeated failures and heavy losses, one friend after another withdrew from the enterprise. Nearly every resource had failed. Sustained by a few, at last success crowned an effort not to be over-estimated in its influence upon the material prosperity of the country. Iron had been manufactured from anthracite coal. It was upon the occasion of a banquet given in honor of this event, at which Henry C. Carey, Thomas Chambers and others were present, that Nicholas Biddle gave his celebrated toast: "Pennsylvania; like her sons rough and rugged—plenty of coal to warm her friends, and plenty of iron to cool her enemies." Burd Patterson was the founder of the Pioneer Furnace, at Pottsville (the nucleus of the extensive operation of C. M. Atkins), where he met his first success in the manufacture of iron. In connection with Thomas Chambers, and receiving efficient aid from Peter Baldy, he started the "Rough and Ready" Iron Works, at Danville. He aided in the erection of the Shamokin Furnace, and also in the furnace at Farnsville. He also built the furnace at St. Clair, now owned by James Lanigan. He had himself, at an early day, conceived the idea of manufacturing steel from pig-metal, and as a consequence, when the Bessemer process was discovered, his mind was prepared for it. He made earnest efforts for its introduction in this country. He published pamphlets containing reliable information on the subject, which he forwarded to leading iron men and capitalists in this and other States. He sent, at his own expense, John Pott, in company with an Englishman who professed knowledge of English iron works, to Great Britain for the purpose of getting full and accurate knowledge of the iron works of England, Scotland and Wales. To his mind no enterprise was too grand; and yet there was no detail but had its significance. For a period of forty years his life was devoted to the discovery of coal and iron ores, their production and manufacture and the transportation of the same to market. He died at Pottsville, on March 31st, 1867. At a meeting attended by the most prominent citizens of Pottsville, resolutions were passed in commemoration of his services. His death was felt to be a public loss.

JOHNSTOWN ALE BREWERY, Lambert & Kress, Proprietors, Johnstown. The brewery was founded by the present proprietors, in 1867, who erected the buildings now occupied by them on the banks of the Conemaugh river, and also those lying at the foot of the hill. These comprise a brewery and malt house, 150 by 42 feet in dimensions; and cooper shops, 100 feet front and of a good depth. The finest quality only of barley is purchased, and the hops are obtained from New York and Wisconsin. The water is the "White Cat Mountain," which is obtained from the water works. The capacity of the brewery is about 250 barrels weekly, having increased three-fold since the business was established. The trade is not only local, but considerable quantities are shipped both East and West, and wherever known have established a good reputation. The premises are amply provided with appliances for the extinguishment of fire, should such a casualty occur. There are ten hands constantly employed by the firm.

CONRAD AUGUSTUS LAMBERT was born, June 17th, 1822, at Ostkoten, on the Rhine, Germany, and was educated on the homestead by private tutors. He entered the mercantile business at Frankfort on the Main, in 1838, where he remained till 1842, whence he returned to the family estate to superintend farming operations. He continued there until 1849, when he emigrated to the

United States, landing at New York, and thence proceeded to Philadelphia. He there effected an engagement as clerk in the wholesale liquor establishment of Roland Cromelein. In 1851, he returned to Germany, where, however, he remained but a year, and once more came to the United States, where he engaged in the cigar and tobacco commission business in New York city. He next removed to Philadelphia, to represent the firm of R. Nongaret et fils, and subsequently went into business on his own account, as importer and dealer in Rheinish wines and liquors. In 1862, he removed to Washington and conducted a sutler's supply store, and afterwards assumed the sutlership of the 75th Regiment Pennsylvania Volunteers, Colonel Bohlen. He next went to Hilton Head, South Carolina, where he carried on a bakery until 1866, when he returned North, located at Johnstown and commenced business. He was married, 1859, in Johnstown, to Louisa Kress.

CHARLES FREDERICK KRESS was born, 1837, in Hesse Darmstadt, Germany, and was educated in his native town. He accompanied his parents, while very young, to America. He first settled in Johnstown, in 1857, and was engaged in mercantile business, in which he continued until he joined his brother-in-law in establishing the Johnstown Brewery.

H. S. MYERS & CO., Builders of Steam Engines, Boilers, etc., York. These works were founded, in 1865, by a company which, however, did not prosper very well. Two years later, Henry S. Myers purchased the interests of all except Reuben Hoffeius and W. A. Myers, and the firm of Hoffeius, Myers & Co. commenced more active operations. In 1868, Reuben Hoffeius disposed of his interests in the concern to H. S. Myers, and the firm was changed to its present style. Henry S. Myers is the only active partner; his brother, W. A. Myers, and A. S. Musselman, each holding an interest in the enterprise. The works are located on North Duke street, near the Pennsylvania Railroad depot, and occupy a lot 102 by 300 feet, on which are erected five detached buildings, covering nearly the entire area. The works, though originally intended for the manufacture of agricultural implements, are now devoted to the building of stationary and portable steam engines, boilers, gang mulleys, circular mills, pulleys, shafting, couplings, posts and socket-hangers, bevel and spur gear, key-sawing machines, milling machines, steam and hand pumps; also saw and grist mill work of every description. When in full operation, nearly 100 hands are employed. The trade is principally local, although some of the articles are shipped to various points in the United States, and also to Canada.

HENRY SLAGLE MYERS was born, 1842, in Adams county, Pennsylvania, and received a part of his education at Princeton, New Jersey. He never learned a trade, but engaged at once in business, as above stated, that being his first venture.

SUSQUEHANNA STEAM SAW MILLS, H. Small's Sons & Co., York. This business was established in 1845, and is at the present time carried on by D. E. Small, J. H. Small and C. Billmeyer, under the firm-name of H. Small's Sons & Co. The capacity of the mills is 30,000 feet per day of white pine, hemlock and oak timber, particular attention being paid to white pine ship-decking, oak planks for ship-builders and also for bridge timber. The firm also manufacture building lumber of every description, including doors, sashes, blinds, frames, flooring, pickets, shingles, etc. The firm have a large depot at Wrightsville, on the Susquehanna, for lumber. The same partners are also proprietors of the

YORK CAR WORKS, which were established in 1852 and are carried on under the firm-name of Billmeyer & Smalls. These works occupy ten acres of ground, at the rear of the Pennsylvania Railroad depot, and form the largest industrial establishment in the town. Freight cars of every description are built, the capacity being from twenty to thirty eight-wheel cars and from forty to fifty four-wheel cars per week. The total number of hands employed in these two establishments, including the lumber department at Wrightsville, is 250.

WISTER FURNACE, Harrisburg, was erected, in 1867, by J. & J. Wister. It is located on a tongue of land lying between the Pennsylvania Railroad on the east and the Pennsylvania Canal on the west; and being so situated, it draws its supplies from both sources. The height of the stack is 45 feet, and the bosh is 14 feet in diameter. The

engine was built in Baltimore, by Denmead & Son, and is of the horizontal pattern, driving two blowing-tubs, each 6 feet in diameter and 6 feet stroke, yielding 7500 cubic feet per minute. The velocity of the engine is indicated by a dial attached to a ratchet, worked by a governor. This device was invented by the chief engineer of the furnace, as a means of keeping the engine at a regular speed; and furnacemen will appreciate the value of this machine, as the regularity of the work depends upon the volume of air being constantly the same. The dial shows, at all times, the exact speed at which the engine is running. The pneumatic hoist is built after the John Fritry pattern, and has worked with great regularity. The ores smelted are magnetic, with some fossil and hematite. The fuel is anthracite coal, from the Schuylkill region, shipped via the Schuylkill & Susquehanna Railroad, a branch of the Reading; 12,000 tons are used yearly. During the same period, 14,000 tons of ore and 6000 tons of limestone are consumed, producing 6,100 tons of pig-metal.

YORK SCALE WORKS, Root & Case, Proprietors, York. These works were founded, in 1842, by Joseph Root and E. J. Case, forming the firm of Root & Case, who have ever since continued the business. The manufactory was at first located on North Beaver street, whence they removed, in 1853, to the site now occupied by them on North street. The building measures 50 by 48 feet. Only platform scales are made, and of the Gay patent until it expired. In 1871, letters patent were granted to themselves and S. C. Baker for an improved weighing scale; they have likewise made many other improvements, and are constantly augmenting them. Their patrons are chiefly coal and iron companies in Pennsylvania and the neighboring States. Ten or twelve hands are employed during the busy season. A majority of their workmen have been in their establishment a long time, some as high as twenty years. The value of their productions averages $12,000 yearly.

EMERSON J. CASE was born, 1815, near the city of Hartford, Connecticut, where he was educated and grew to manhood, meanwhile learning the trade of a scale-maker. He removed to York, in 1842, for the purpose of engaging in this business. He has been a member of the Borough Council for several years. In religious faith he is a Presbyterian.

JOSEPH ROOT was born, 1813, in New Hampshire, where he was educated and subsequently taught school. He afterwards learned the trade which now engages his attention, and came to York in 1842. For a short period previous to the latter date, both he and his present partner pursued the same calling near Downingtown, Pennsylvania.

LOCHIEL ROLLING MILL COMPANY, of Harrisburg. President, Henry McCormick; Superintendent, A. J. Dull. The works of this company embrace three separate departments: the furnace, rolling mill and machine shop. The Lochiel Furnace was put in blast, for the first time, April 14th, 1873. It has a bosh 14 feet in diameter, a stack 52 feet high and a blowing tub engine with cylinder of 84 inches diameter and 4 feet stroke of piston; this latter is a successful experiment, showing that a short stroke engine is equal, if not superior, to long stroke engines for the use of furnaces. The iron ore used by the furnace is mined chiefly in Franklin and Juniata counties, and 18,000 tons are annually consumed, requiring for its conversion into pig-iron 12,000 tons of anthracite coal and 7800 tons of limestone during the same period. The product is about 7200 tons of metal, which is supplied to the other works of the company.

THE LOCHIEL ROLLING MILL is situated on the fine table land between the Pennsylvania Railroad and the Pennsylvania Canal, at the mouth of Paxton creek, about one and a-half miles southeast of the court house, and comprises, with the machine shops, etc., about 100 buildings, which, if compactly arranged, would cover an area of about twelve acres. Of this number several are large and solidly constructed edifices. The rolling mill measures 350 feet in length and 320 feet in width; it contains 20 single puddling and 8 heating furnaces for rails, 2 furnaces for breaking down, 2 bar mills, 1 18-inch puddle train, 1 18-inch rail train and 3 bar mills, one being of 7 inches, one of 16 inches and one of 18 inches. The remaining buildings, other than the machine shop to be hereafter described, consist of blacksmith shops, storehouses, for storage of the raw material, engine houses, boiler houses and the offices of the company, beside many smaller buildings necessarily included in an establishment designed for such extensive manufactures. The entire machinery in operation is of the most powerful, accurate and comprehensive description, embracing every improvement in their

line of manufacture that ingenuity and long experience have been able to devise. The puddling and heating furnaces are regarded by iron men as models of perfection. They were designed and built by John F. Heatly, formerly of Pittsburgh, a gentleman of very great inventive ability, who is permanently retained in the employ of the company especially to superintend this branch of the business. The building and most of the grounds are illuminated at night with gas manufactured on the premises, and the entire works are supplied with water pumped by steam from the Susquehanna river. A portion of the machinery of the rolling mill was built expressly for its use by Eastern makers, the balance in the machine shop of the company. The products of the works are railroad, bar iron and fish-plates, all of which hold a high rank in the markets and meet with a ready sale. The capacity of the works is about 24,000 tons of iron per annum, in the manufacture of which 30,000 tons of bituminous coal are used. The works were partially destroyed by fire in the fall of 1872, and rebuilt.

THE MACHINE SHOP is auxiliary to the rolling mill. The building measures 100 feet by 50 feet, and is fully supplied withthe finest machinery attainable. A large proportion of the entire machinery of the rolling mill was manufactured here. The advantages accruing from a department of this kind are at once apparent and cannot be overestimated; but its incorporation as a specific branch of the business is worthy of remark, as indicating an intention of making the same auxiliary, in a very high degree, to the development and introduction in this establishment of all mechanical improvements which may yet be possible, and tending to lessen the cost or improve the quality and appearance of a manufacture which has attained a remarkable standard of excellence in these respects.

PAXTON FURNACES, McCormick & Co., Proprietors, Harrisburg. In 1853–'55, Bryan & Longenecker, of Lancaster, projected what is now known as Paxton Furnace No. 1, and located it in the southern suburb of the then borough of Harrisburg, for the smelting of iron ore; but they were not as successful as they hoped to be. Subsequently, the late James McCormick and Robert J. Ross purchased the interest of Bryan & Longenecker and placed it in charge of Henry McCormick, one of the present owners, who proceeded at once to the vigorous prosecution of the business. It required but a few years of his judicious management to show that iron could be as economically manufactured in Harrisburg as in other localities. After the death of Mr. Ross, the entire property was purchased by Mr. McCormick. After operating the Paxton Furnace for a number of years, the McCormicks expanded their business to such a degree that it became necessary to add another furnace, which was erected near the old establishment, and put in blast in 1872, and is called Paxton Furnace No. 2. Furnace No. 1 has a stack of 43 feet height, the bosh is 14 feet in diameter; a blowing tub or cylinder, 7 feet in diameter and 7 feet long, a beam engine, and a capacity of producing 600 tons of pig-iron per month. Furnace No. 2 has a 60 feet stack, with a bosh and blowing tub of the same dimensions as No. 1. It is supplied with a horizontal direct acting blowing engine, and its capacity is the same as No. 1. The iron ore used embraces primitive, from York county, Pennsylvania, and New Jersey, and the brown hematite, from the Cumberland and Lebanon Valleys. The amount of ore annually consumed is 33,600 tons, which requires 24,000 tons of anthracite coal and 16,800 tons of limestone to convert it into 14,000 tons of pig-iron, nearly all of which is supplied to the rolling mills and nail works owned by the same firm.

THE PAXTON ROLLING MILL is located directly on the line of the Pennsylvania Railroad, and near the Pennsylvania Canal, in the First Ward of Harrisburg, and is owned and operated by the estate of James McCormick (deceased), under the management of John Q. Denny. The main buildings cover an area of ground of 250 by 160 feet. The puddle mill has five double puddling furnaces, one train of 20-inch rolls and a steam hammer of three tons weight. Puddle iron is manufactured to the average extent of 130 tons per week. The plate mill has five heating furnaces, one set of sand rolls and one set of chilled rolls, both sets of 25 inches diameter; also a smaller train for breaking down blooms. Boiler and ship-plate, also tank iron, are produced to the amount of 10,000 tons per annum. Thirty tons of bituminous coal are consumed in these two mills every working day.

THE HARRISBURG NAIL WORKS are situated on the Conodoguinet creek, near its junction with the Susquehanna river, opposite the city, and have one of the finest water powers in the State, the dam providing it being 300 feet long with a fall of

eight feet. The original establishment was erected over forty years since, and was long operated by Hon. A. O. Heister. About 1844, the firm of Pratt & Son took possession of it, and after running it a number of years, disposed of their interests in the concern to the late James McCormick, who associated with him Charles L. Bailey, an experienced iron man, under whose skilful management the mill proved a financial success. Mr. Bailey subsequently retired from the concern to attend to other iron interests, and the death of Mr. McCormick following, the establishment finally came into the possession of Henry McCormick, James McCormick, and J. D. Cameron, who continue to operate it under the direct control of Henry McCormick, Treasurer, as Trustees of the McCormick estate. Under the present management the works have doubled their former capacity, and are now ranked as one of the largest establishments of the kind in Central Pennsylvania. Attached to the nail works is a puddling mill and also a nail plate mill. The puddling mill has nine puddling furnaces and one train of nineteen inch rolls with a rotary squeezer. The machinery is driven by two turbine water-wheels. Two hundred tons of puddle bars are made every week. The nail plate mill has three heating furnaces, and a train of nineteen inch rolls, driven by steam. The products are nail plates, fourteen and a half inches wide. The nail factory proper has seventy-three nail machines, with a capacity of 3500 kegs of cut nails and spikes per week; the machinery is here driven by three turbine water-wheels. The entire works consume forty tons of bituminous coal per day.

ALBRECHT & CO., Piano Manufacturers, Philadelphia. This firm was established, in 1862, by Charles Albrecht, Frederick Riekes, and Richard T. Schmidt, under the style of Albrecht. Riekes & Schmidt, and continued so until 1874, when R. T. Schmidt died, and Edmund Wolsieffer was admitted into the partnership, the firm-name being altered to its present style. The factory is at Ridge avenue and Eleventh street, and is triangular-shaped, the two fronts extending about 75 feet each, and being four stories in height, in addition to a basement, which is used as a drying room. The number of hands employed is fifty. They produce about 300 instruments yearly—square and grand—the square pianos ranging in price from $500 to $800, and the grand from $1000 upward. The woods used in the manufacture are the walnut, rose, poplar, cherry, maple, spruce, pine, ash, oak, etc.; the utmost care is required in order that all the various woods may be properly seasoned before being used in the manufacture, and for this purpose they are placed in drying rooms, where they remain for from six to twelve months. The two senior members of the firm are practical piano makers, and have the direct supervision of the factory, the junior partner undertaking the management of the store and mercantile department. The piano trade in the United States has progressed greatly during the last few years and has been growing rapidly in extent and importance, as is shown by the amount of capital invested, the number of instruments made, and the great number of persons employed directly and indirectly in connection with it. The piano is looked upon as almost a household necessity, and the statistics for a recent year show that the piano trade for that period amounted to $59,284,673; and the number of pianos made was 118,280. The piano is the successor of the old spinet and harpsichord, and is not much more than a century old. The inventor of it—or, to speak more exactly, the person who transformed the harpsichord into the mechanical contrivance which now bears the name of "piano-forte"—is not precisely known. The first piano-forte in England, so far as is now known, was the work of an English monk at Rome; and it was brought to England about the year 1757. Piano-forte makers from Germany came over to England about 1760, some of whom obtained much celebrity. A play-bill of Covent Garden Theatre, London, bearing date 1767, announces the production, on the stage, of a piano-forte, which it calls "a new instrument." Letters patent were granted to Joseph Merlin, in 1774, for an improved harpsichord, with hammers, on a plan similar to that of the piano-forte. But the English makers assert a positive claim to the invention of the first "grand action." It is admitted that about 1772, a German by the name of Amercus Backers, and John Broadwood, and Robert Stodart, the three being then in the employ of Burckhardt Tscudi, a distinguished manufacturer, and father-in-law of the subsequently still more distinguished John Broadwood, conjointly succeeded in applying to the harpsichord an action like that then in use in the piano-forte. That action was in principle the same as that still preserved in the Broadwood instruments, and in an improved form is the same now used by the leading piano-forte makers of this country. It is simple, efficient, and durable, and is called the direct action; and with improvements it is the form now used by Albrecht & Co. In the

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early piano-forte all parts of the instrument, scale, stringing, sounding-board, and action were very imperfect, and its resources limited, the best pianos having only a compass of five octaves. Improvements and new applications have been constantly made, and during the past twenty-five years the progress towards perfection has been very rapid and marked. The compass of the key-board has been increased to seven and a quarter octaves; the old-fashioned brass strings have given place to steel; the power or tone of the instrument has been enlarged more than fourfold; and the action has been brought to a degree approximating a perfection not even dreamed of, or hardly dared to be hoped for by the makers of the last century. In the earlier instruments with small strings the frame was made of wood only, but iron finally came to be used for the "piano-frame" (not the case, but the parts supporting the strings), and this plan of frame is generally used in Europe. The strain upon the frame, made by the tension of the strings, being enormons—amounting to several tons—it will readily be seen how necessary to efficiency the iron frame is. No wooden frame yet devised can withstand the strain, and as iron is capable of being finely wrought without detracting from its strength, the iron frame does not add appreciatively to the weight of the instrument. This firm by great care in every point of the manufacture have succeeded in producing a superior class of pianos, the most noteworthy points in their productions being strength and durability, elastic and even touch, and precision and promptness of action. Their latest improvement is the "Double Agraffe," a feature in piano making which greatly enhances the clearness and brilliancy of the treble.

SUSQUEHANNA PLANING MILLS, John B. Bachman, Proprietor, Columbia. This establishment was founded, in 1851, by a gentleman who held it for a few years, and disposed of the same, in 1860, to its present owner. The yard is situated on the Susquehanna river, and has the further advantage of being on the line of the Pennsylvania Railroad, at the junction of the Reading & Columbia, and the Columbia & Port Deposit Railroads, the most eligible location for business on the river shore. The extent of ground employed in carrying on the business is three and a half acres. The capital invested in this enterprise is about $80,000. The planing mill produces yearly from 3,000,000 to 4,000,000 feet, and gives employment to some twenty hands. In this special department the proprietor has had a practical experience of nearly a quarter of a century, which enables him to superintend it personally and efficiently, in all its details. In connection with the planing mill is a large sash, door, and blind factory, which is carried on by the firm of Bachman & De Huff; George De Huff being associated with John B. Bachman in this enterprise. The capital here invested is $40,000, and until the financial panic of September, 1873, occurred, forty-seven hands were constantly engaged to carry on its operations. The annual manufactures are valued at about $100,000. A market for the productions is found in adjoining counties both in Maryland and Pennsylvania; a considerable amount is also shipped to Philadelphia. Their principal customers, until recently, have been the Pennsylvania Railroad Company.

JOHN BAIRD BACHMAN was born, 1820, in Bart township, and educated in the common schools. He passed the greater portion of his boyhood in the country, and learned the carpenter's trade. He located in Columbia, in 1852. He is a public-spirited man, and has assisted in developing most of the enterprises of the town.

COLUMBIA OIL WORKS, Truscott & Co., Proprietors, Columbia. These works were established and went into operation, June 8th, 1865. The proprietors, at that time, consisted of Samuel Truscott and Joseph W. Guernsey, trading as Truscott & Guernsey. Shortly afterwards a brother of the latter, George Guernsey, was admitted into the partnership. In July, 1867, the senior partner purchased the interests of the Guernsey brothers, and, in August of the same year, John W. Steacy and Michael S. Shuman were admitted to a participation in the concern, and now constitute the "Co." of the present firm. The works were at first located at the northwest end of Columbia, where they remained until the summer of 1873. Thence they were removed to what is known as the "Fairview Grounds," at the opposite extremity of the town, near the Susquehanna river. The crude oil from Butler or Venango county is emptied from the cars into pipes at the side of the railroad, which are fitted to receive the contents of six cars at a time. It is now conveyed to a great storing tank, of the capacity of 90,000 gallons. From this the oil passes to two stills, holding together 10,125 gallons at a single distillation.

The condenser, in which the pipes lie to receive the vapor as distilled, is 8 feet wide, 5 feet deep, and 110 feet long. When the vapor is condensed into oil again, it is carried by a steam pump to the agitator, in which it is subjected to a cold air blast and the action of chemicals, and is then the oil of market, ready for use; after barrelling it is disposed of to the trade. Although the Columbia Oil Works are principally intended to supply the local trade, large contracts are occasionally taken. There is a capital of $40,000 invested, and though the works are not running heavily at present their capacity is about 40,000 barrels per annum.

SAMUEL TRUSCOTT was born, March 17th, 1812, in England. He accompanied his father and family to this country, in 1818, and settled at Frederick, Maryland, where he grew to manhood. After a short residence in Baltimore, he went to Columbia, in 1837, and having already learned the trade of a pattern-maker, pursued that calling in an iron foundry there, for the space of twenty years, beginning as an employé and ending as proprietor. He has served one term in the Town Council, and continues to take much interest in local affairs.

JOHN W. STEACY was born, 1833, in Lancaster county, Pennsylvania. He received a common school education, and then learned the trade of a moulder. He afterwards turned his attention to the dry goods business, with which he was connected for seventeen years.

MICHAEL S. SHUMAN was born, 1825, in Lancaster county, Pennsylvania; but was educated and grew up to manhood in York county, where he learned the trade of a carpenter. He went to Columbia, in 1844, and for many years pursued his calling as carpenter and builder, relinquishing the same to engage in his present business.

A. BRUNER & BROTHER, Steam Saw Mill and Lumber Yard, Columbia. The business dates over a half century ago, having been established by Abraham Bruner, the elder, and father of the present proprietors. He was largely identified with the progress of the town, and was very prominent as a builder and property owner. He died, in 1870, at the age of seventy-nine, leaving his extensive business to his two sons, Abraham and Cyrus Bruner. He was at one time Chief Burgess of the borough, and took an active interest in all local enterprises. The lumber yard is situated on the river front, with the Pennsylvania Railroad tracks running directly through it. The yard extends 900 feet on the river, and is bounded by Union, Front, and Mill streets, comprising between three and four acres of ground, which is devoted to the storage of lumber and as a site for the steam saw mill; which latter is supplied with all the latest improvements in saws, both vertical and circular. Between thirty and forty hands are employed during the busy season. The capital invested in the lumber yard and saw mill is $150,000. The firm do not confine their operations to pine and hemlock, but deal in Southern pine, ash, walnut, cherry, and oak; and being interested in a planing mill and sash and door factory are enabled to supply window-frames, sashes, doors, blinds, palings, shingles, etc. The facilities enjoyed by the establishment are unsurpassed. The railroad runs directly to the mill, and lumber and timber can be handled with the greatest ease; a steam crane being used for the purpose. The trade of the house extends throughout the State both east and west.

ABRAHAM BRUNER, JR., was born and educated in Columbia, Lancaster county, Pennsylvania, where he occupies a prominent position. He is largely interested in real estate as a builder; is a thorough and active business man, and the controlling spirit of the firm. He was, at one time, Chief Burgess of the town, and has served as a member of Councils for several terms.

CYRUS BRUNER was born, in 1836, in Columbia, and was educated in various schools, among others the Lewisburg University. During the War of the Rebellion he enlisted twice as a private, and rose each time from the ranks to the grade of First Lieutenant. He has a good record as a soldier, and was wounded at the battle of the Wilderness. He is a Republican in politics.

LEBANON VALLEY FURNACE, J. & R. Meily, Lebanon. This furnace was founded, in 1867, by Lyman Nutting, John Meily, and Richard Meily, trading under the firm-name of Meily & Nutting. In March, 1874, the latter withdrew, and the remaining partners carry on the concern in the style of J. & R. Meily. The property consists of about sixteen acres of land, whereon is erected the

furnace casting house and all necessary outbuildings. About eighty hands are employed by the firm, who produce an average of 6000 tons of pig-iron yearly.

COLUMBIA SLATE WORKS, W. M. McClure, Proprietor, Columbia. These works were established, October, 1873, by the present proprietor, and are located at No. 111 Locust street, adjoining the Pennsylvania Railroad Depot; and six hands were employed during the first year the works were in operation. So successfully have they been conducted, that this force was doubled, and the buildings remodelled during 1874, many improvements being added, and the whole presenting a handsome business-like appearance. The property has a front of 56 feet, with a depth of 207 feet. Here are manufactured marbleized and plain slate-ware, the specialty being marbleized mantels, in imitation of all the celebrated foreign and native marbles. Here may be seen the counterpart of the Egyptian, veined with gold, the Tennessee, the Lisbon, and the Belgian marbles, and also imitations of Malachite, Porphyry, Jasper, and Verde Antique. The superintendent is John J. White, who made the first marbleized slate mantel in America (Boston, 1848), the art having been brought to perfection in France. The superintendent has the entire charge of the mechanical branch of the work, and the great success of the establishment is attributable to his excellence as a workman. The proprietor intends making further improvements in his already very fine buildings. The business is growing rapidly, and he expects to open warerooms in Baltimore and Pittsburgh. As yet the demand is local, being confined to the interior of the State—as Harrisburg, York, Lancaster, etc. The establishment is supplied with slate quarried at Hydeville and West Castleton, Vermont; also from Slatington and Peach Bottom, Pennsylvania.

WILLIAM M. McCLURE was born, 1831, in Chester county, Pennsylvania, where he was educated both in the common and private schools. On arriving at manhood he went to Kansas and engaged in the lumber business. He became interested in the political questions of the day, and took an active part with the Free Soil party. During the troublous times that existed his business was broken up and he left that section. At the commencement of the War of the Rebellion he entered the Eleventh Pennsylvania Regiment as Captain, and served during the three months' campaign of that organization. He subsequently entered the three years' service as Captain in the Second Pennsylvania Artillery, and was promoted to the Colonelcy of the regiment in the fall of 1864. He was honorably discharged in the spring of 1865, and retired to private life. He next engaged in the coal shipping business at Sunbury, Pennsylvania, where he continued until he embarked in his present avocation.

CLARENCE A. HART, Manufacturer of Military Trimmings, Regalia, and Theatrical Goods, No. 133 North Third street, Philadelphia. This business was established at 131 North Third street, about 1834, by the late William G. Mintzer, who conducted it successfully until his death, in 1870. The executors of the estate offered the establishment at public sale, and the entire concern was purchased by R. M. Robinson and C. A. Hart, who thereupon formed a co-partnership under the firm-name of R. M. Robinson & Co., and operated the same for over a year, when the present proprietor purchased the entire interest of his co-partner, and has since given his entire attention to the business, which consists of military trimmings and equipment of all descriptions, including every style of flags, banners, and decorations; comprising, in this department, the flags of every nation for army, merchant, or naval service. Military companies and military bands are supplied with the latest and most approved styles of caps, epaulettes, belts, and other accoutrements, all of which are manufactured on the premises. The department for the display of goods needed by secret societies—consisting of regalia, banners, and emblems—is the most complete in the country, and this may be regarded as the specialty of the house. The correct style of outfit for every known secret order can be obtained at this house, and all information as to the uses of its regalia explained, as nearly every society, old and new, is represented by membership of either the proprietor or some of his numerous employés. A point is made in this particular, in order to be able to correctly produce all the articles composed in the paraphernalia of each organization, thereby saving his patrons the trouble and annoyance of alterations and delays. So complete are the arrangements in this particular branch that the outfit for a whole lodge can be supplied at a single day's notice. In connection with this department is the manufactory, where a large number of hands are employed in embroidering in gold, silver, and

bullion, the rich patterns that ornament the various collars, aprons, sashes, etc., which this establishment is daily producing. Gold, silver, silk, worsted, and bullion cord and tassels are also made in this department. Another attractive feature is the making and painting of silk flags and banners, for which the house has great facilities, employing the services of an eminent artist, whose sole duty is to furnish designs, and execute them in silk. So highly and carefully must the colors be prepared and applied, that after the elaborate picture is painted on each side of a single thickness of silk, the flag must be of sufficient pliability to allow of its being folded into any number of creases without being defaced by cracking or injured by abrasion. Of the single article of ball badges alone this firm manufacture about 25,000 per annum, ranging in price from twenty-five cents up to five dollars each. The establishment is known all over the country, and orders are constantly being executed for the most distant parts. The reputation of the house is not solely on account of the excellence of its products, but it also possesses the confidence of the community in its business relations.

READING BOLT AND NUT WORKS, J. H. Sternbergh, Proprietor, Reading. This business was established by the present proprietor, in 1866; the amount of capital then invested being about $20,000. Since that period the works have been materially increased; additions having been made and new buildings erected in 1868, 1870, and 1872. The site occupied by the works is on North Third street near Buttonwood. The building is partly brick and partly frame, 212 feet front and 140 feet deep, and is erected on a two and one-half acre lot. The West Reading Railroad passes the premises, a siding of which runs into the yard of the works. The building contains the most approved machinery and appliances, and none but first-class articles are manufactured. These consist of hot pressed nuts—square and hexagon—machine bolts, washers, coach screws, etc., and are the specialties; but the works embrace a wider range, and may be said to consist of a machine shop, nut and bolt factory, smithery, forge, and rolling mill. The machine shop is well supplied with lathes, planers, and drills of modern construction. Adjoining this is the nut factory, which contains eight nut machines of different sizes, each capable of making from thirty to sixty nuts per minute. The machinery is *sui generis*, the invention of the proprietor, and is secured to him by letters patent. Each stroke or movement of the machine produces a nut, *i. e.*, cuts a square piece of iron from the heated rod, presses it, and punches a hole in the centre. It is almost finished at this one operation, a small burr along the edges being subsequently removed also by machinery. In this department are also three bolt-heading machines of superior construction and large capacity, adapted to make square, hexagonal, button, tee, and other heads of uniform size and fine finish. There are several furnaces in this department in which the prepared iron is heated ready to be cut and pressed into nuts. This mode is claimed to be superior to the old process of punching the nuts cold. The fuel which is consumed in the furnaces generates steam for the engine which propels the machinery. In the rolling mill are a ten-inch train of three high rolls, adapted to the rolling of all sizes of iron up to two and a quarter inch round and square; two heating and one puddling furnaces; a large Sturtevant blower, driven by a separate engine; a 1500 pound steam hammer, capable of striking a blow of three or four tons; a pair of steam shears, driven by an independent upright engine, free of pulleys, cutting on one side iron bars four by two and a quarter inches, and smaller; and on the other iron plates one inch thick and twelve inches wide, which were erected by the proprietor. There is also machinery for threading the bolts and nuts, milling, and shaping, and a tumbling machine or churns for smoothing the small articles manufactured. Various kinds of bolts are made, and the nuts embrace all sizes, from the most diminutive, or several to the ounce, up to those weighing seven or eight pounds each. The iron used is both hammered and rolled. The stock is mostly scrap iron; while the bar iron is of extra quality, made on the premises in the furnaces which were erected in 1872, where is also produced a superior grade of horseshoe iron. Besides the several articles already named, attention is given to the manufacture of shafts, axles, rods, forged iron, shapes for patterns, etc. In the works are two steam engines, each of sixty horse power, one an upright, the other a horizontal engine; the latter drives the nut machines, lathes, planers, and blast; the former propels the rolling mill exclusively: also a small engine of ten horse power which drives the blower. Bituminous coal is consumed in the furnaces of the rolling mill, and anthracite in those of the nut factory. The store-room is in the northern end of the building, and above it on the second floor is the shop where the boxes are made for packing the goods: the sawing is done by a circular saw. Dur-

ing the first year but ten hands were employed, and the value of the goods produced was about $15,000, the second year $20,000, and the third year $50,000. In 1872, the value had reached $125,000. From eighty to one hundred men are employed, and the capital at present invested is about $200,000. The success of the works is to be attributed to the fact that nothing but first-class goods are made, from the best material obtainable.

JAMES HENRY STERNBERGH was born, May 20th, 1834, in the city of Rochester, New York, where he attended school for a period, and completed his education at Saratoga Springs. He then found employment in the railroad office at the latter place, and after five years' service was put in charge of the passenger and freight business, to which he attended for eleven years. He removed to Reading in the autumn of 1865, and engaged in his present avocation. He is an active and prominent member of the Young Men's Christian Association of Reading. He married, June, 1862, Harriet M. May, of Sturbridge, Massachusetts.

MARTIN BELL, Iron Operator, Sabbath Rest, Blair county, was born, January 1st, 1808, in that county. He is the son of Edward Bell, born 1770, who married Mary Ann Martin in 1799, both of British descent. He was educated at home, and as soon as he reached the proper age was occupied as millwright, carpenter, and assistant surveyor till 1828, when he succeeded the assistant engineer in the construction of the Pennsylvania Canal between Mifflin and Lewistown. In 1833, he aided his father in building the Elizabeth Blast Furnace. While so engaged he devised a plan to utilize the gas from the furnace head in a steam boiler. The improvement was patented, after much trouble, in 1840, but want of means and the calls of other occupations prevented the discovery from being generally introduced at the time. Subsequently a renewal was obtained, and it was found that the same invention had been claimed and patented in 1838; but the alleged inventor had in fact purloined the idea from the Elizabeth Furnace, as was proved on trial. From 1842 to 1847, he rented and managed his father's furnace, rebuilding it and carrying out the rule he has always observed of preventing all work upon the Sabbath. These alterations caused an increase of twenty or thirty tons in the weekly product. The furnace was idle from 1867 to 1872, through the failure of the ore bank, but was then started with charcoal fuel. Originally a Democrat, he has been an Anti-Mason, a Free Soiler, an Abolitionist, and a Radical Republican. Temperance, freedom, public education, and the strict observance of the Sabbath are cardinal principles with him, for which he has always been ready to spend time and money. He has been School Director for thirty years, a member of the Baptist Church for thirty-three years, and was at one time candidate for State Senate on the Temperance ticket. Probably no other man in Blair county has exercised so much influence for so long a period. His improvements in the blast furnace are recognized as of great value by metallurgists. In 1836, he married Eliza M. McKnight, and has three sons and four daughters.

CHESTNUT HILL IRON ORE COMPANY, Moses Taylor (of New York city), President; P. R. Pyne (of New York), Secretary; Charles J. Nourse, General Superintendent, Columbia. The mines owned by this company are situated both in Carroll county, Maryland, and at Chestnut Hill; the latter, however, is the principal source of supply. The ores are mined by the company and transported to their furnaces in Columbia. These are three in number, and are located on Union street, at the intersection of the Reading and Columbia and the Pennsylvania railroads. Furnace No. 1 was built some time previous to 1840; No. 2 was erected in 1854; and No. 3 in 1867. Material alterations in all these furnaces were being made in the spring of 1875, with a view to increasing their capacity and effectiveness. Pig-iron is the sole manufacture. About 500 hands are employed at the works and mines, when in full operation.

PENN WORKS, Neafie & Levy, Proprietors. These works were established, in 1844, by the firm of Reaney, Neafie & Co., consisting of Thomas Reaney, Jacob G. Neafie, and William Smith, and the style remained unchanged until 1861. Meanwhile, however, William Smith had died, and, in 1845, Captain John P. Levy had been admitted a member of the firm as financial partner. In 1861, the senior partner retired, and the style became Neafie & Levy. The latter died in December, 1867; but since that date the heirs have taken his interest in the establishment, and the old firm name, which had become

so widely and favorably known, has been retained. When the business was first organized there were but a few wooden sheds on the premises, then comprising but a portion of the extensive tract of land now occupied. The location at that early day was at the corner of Beach and Palmer streets, in the old District of Kensington, now the Eighteenth Ward of the city of Philadelphia. Moreover, their facilities for work, in the way of machinery and tools, were very limited; and at the outset they employed but twenty-five hands, and their productions were confined to small boats, tanks, and forgings. Step by step, however, these works have increased in size, number of employés, and productions annually sent forth, until at present the establishment is properly and deservedly ranked among the leading iron works of Philadelphia. During the Mexican War the firm built the engines for several Government vessels which took part in that contest; and, in 1850–'51, when the discovery of gold in California had directed attention so largely to that point, the firm did an extensive business in manufacturing stamping mills and other machinery for separating the gold from the ore. A large business has also been developed by this house in propeller wheels for steamships; they being the proprietors of the patent right for the "Curved Propeller," which has attained deserved popularity; and the demand for their peculiar wheel has been so great from the Dominion of Canada and on the lakes, that they found it necessary to connect themselves with several extensive establishments on those inland seas. This trade was secured by J. G. Neafie while on a pleasure tour through the Western States. Previous to 1860, the firm had constructed the engines for the steam sloop "Lancaster" and gunboat "Pawnee," as well as for sundry other smaller craft in the merchant service. During the War of the Rebellion the works were taxed to their utmost capacity, over 800 men being constantly employed, and they constructed the engines for about 120 Government vessels, some of which were the largest in the service. The firm also, about this time, became engaged in the building of steam fire engines of superior capacity and workmanship. Their specialty, however, is the construction of marine steam engines and iron ships, and their facilities for producing these are unquestionable. Among those constructed by them for the merchant service may be named the iron steamships "Oriental," of 1500 tons; the "Havana," 2200 tons; the "General Scott," 1100 tons, etc., and many others of smaller tonnage, that have added to the glory and efficiency of the American marine. The area of ground now occupied by this establishment is about eight acres, and within these limits are the buildings, tools, and all the facilities necessary for constructing, not only stationary and marine engines, high and low pressure boilers, heavy and light forgings, but for building all sizes of iron and wooden vessels. There is a frontage on the river of over 400 feet: there are docks in which twelve ships can ride abreast; shears and tackling that will raise a hundred tons; a machine shop 165 by 60 feet, three and a half stories high; a boiler shop 180 by 60 feet; a blacksmith shop 130 by 40 feet; an erecting shop 80 by 70 feet; a foundry 150 by 60 feet—all equipped and provided with the best tools. In the blacksmith shop and forge are large steam hammers, and the heaviest forgings, such as propeller shafts, etc., are made here. In addition to all these, must not be forgotten the marine railway, capable of receiving and moving a ship of 600 tons burthen. Since the establishment of the works, in 1844, up to 1874, there have been constructed in them over 600 complete engines. The average number of hands employed is about 500. In 1872, the wages paid to workmen were nearly $300,000, and over $800,000 worth of material was consumed; while the receipts for their various productions exceeded $2,000,000. The total tonnage constructed, in 1873, was over 3000 tons; among the vessels—chiefly tugs—was the "Dahlia," of 450 tons, for the United States Signal Corps service. During the whole period of their existence the firm have accumulated a vast stock of patterns, which are all carefully preserved in an immense fire-proof room; so that whenever required to furnish duplicates the model can be readily ascertained. Among the many preserved with care is the model of the engine for the "Polaris," the vessel which conveyed Captain Hall and his party to the Arctic regions.

JACOB G. NEAFIE was born, December 25th, 1815, in Monmouth county, New Jersey, and when quite young removed with his parents to New York city, where he received his education in the common school. In 1831, he commenced to learn the trade of a blacksmith and machinist. From an early age he had shown a strongly-marked mechanical bias, which, as he grew older, displayed itself in the making of models and patterns. This circumstance was the means of determining the special direction for his talents, and of inducing him to select Philadelphia as his future field of labor. In 1832, while on a holiday visit to Barnegat, on the New Jersey coast, the steamer "Norfolk," owned by Thomas Holloway, marine engine builder, of Philadelphia, put into the inlet at that

Isaac McBose

place. The young machinist was offered a position in Philadelphia by the ship-owner, and accepted it. He was shortly afterward regularly indentured and commenced his apprenticeship. He soon mastered all the details of the business, and in a short time he became foreman of the establishment. After attaining his majority, in December, 1836, he worked for two years as a journeyman in other machine shops, and, in 1838, started in business on his own account, renting a workshop on the corner of Second street and the present Germantown avenue. The times were not propitious, for it was immediately after the great financial panic of 1837, and every kind of business was in a prostrate condition. However, he persevered, and, in conjunction with his partners, has developed the business from its small beginnings up to its present great extent.

JOHN PATTERSON LEVY was born in St. Mary's, Georgia, July 25th, 1809. His family were nearly all connected with ships and shipping business. His grandfather, Colonel John Patterson, at one time owned and had an extensive ship-yard on the ground which is now the United States Navy Yard at Philadelphia; which property he sold in 1797, and removed to St. Mary's. His uncles, John, Charles, and William Patterson, were all masters of ships, and his father also was for a time engaged in the shipping business. At an early age he showed great inclination for a seafaring life; but yielding to his parents' wishes, he adopted the trade of a shipwright, and was apprenticed to a firm in Philadelphia. Having served his time to his trade, he began a seafaring life, and soon became first officer of a Liverpool packet ship, and shortly afterward obtained command of a vessel, in which he made many voyages to Europe and up the Mediterranean. On one occasion, while bound for New York with a cargo of cotton from Mobile, Alabama, the yellow fever broke out on board the ship with such virulence that all the crew died except himself, one of the officers, and the steward. These three men succeeded in bringing the ship into port, and Captain Levy then himself fell sick. Shortly afterward he invested in the line of boats running between Philadelphia and New York, one of which he himself commanded. While engaged in this trade he became acquainted with Thomas Reaney and Jacob G. Neafie, by running his vessel to a landing close by their workshop (which was on a part of the present site of the Penn Works), and giving them what repairing work was needed on the ship. The intimacy which thus grew up resulted in a partnership; Captain Levy undertaking the care of the financial affairs and the general business management, and the other two partners devoting themselves exclusively to the mechanical department, for which they were especially fitted. From small beginnings this firm has now become one of the largest industrial establishments in America. Captain Levy died at Aiken, South Carolina, December 26th, 1867.

TEMPLE FURNACE, Clymer, McHose & Co., Proprietors, Reading. This furnace is located at Temple, on the line of the East Pennsylvania Railroad, in Berks county. In 1871, Isaac McHose purchased a half interest in the same, when the present firm was formed. The stack is 45 feet high, and the bosh has a diameter of 13½ feet. The ores reduced are the magnetic and hematite, and the average annual capacity of the works is estimated at 7000 tons: the actual yield, during the year 1872, was 6711 tons. A new furnace has been projected by the firm.

ISAAC McHOSE, of the above firm, was born, December 6th, 1822, in Lehigh county, Pennsylvania. His father, who bears the same name, is a mason by trade, and a prominent citizen of Hanover township. The son, after receiving an ordinary common school education, learned the trade of a bricklayer. In 1839, he devoted his attention to furnace building, and became in time a thorough master of the art, which he has followed to the present time. His experience has been immense, and he is considered one of the best, if not the best, furnace builder in the United States; for he has been more successful than any other, and his reputation extends over the whole country. In 1851, he removed to Reading, and, in 1853, purchased, remodelled, and reconstructed his present fire-brick manufactory, considered to be the largest and most successful in the Union. His annual production is 3,000,000 of fire bricks, worth $150,000, and he has $100,000 invested therein, the result of his untiring industry and capabilities, as he had no capital originally, nor did he obtain any pecuniary or outside assistance. As stated above, he owns a half interest in the Temple Furnace, and has also largely invested in the Topton Furnace, which also lies on the line of the East Pennsylvania Railroad, and in the Millersburgh Furnace, in Lehigh county. During the War of the Rebellion he was among the largest contributors of pecuniary means to carry it on, and, although not drafted, furnished a "volun-

teer," whose bounty, amounting to $700, he himself paid. His son-in-law, J. L. Boyer, is in the Temple Iron Company; two of his sons are intended for his own peculiar line of business, and a third is Superintendent of the Millersburgh Furnace.

VARIETY IRON WORKS, E. G. Smyser, Proprietor, York. This business was established, in 1840, by Geiger & Bechtol, for the manufacture of the old-fashioned ten-plate stove, at the corner of North and Beaver streets, York, which site has never been changed since the first inception of the works. The original buildings were frame, two in number and each about 40 by 50 feet. These have been since replaced by very handsome and much larger brick structures. The founders of the enterprise carried on the business until 1846, when the firm was dissolved, the senior partner withdrawing, and the remaining member associated with him Dr. Alexander Small, assuming the firm-name of S. Bechtol & Co. These, in turn, gave way to the partnership formed in 1853 by Dr. Small and E. G. Smyser, and the business was now carried on in the name of Small & Smyser. Some increase in the manufactures had taken place under the previous firm, by reason of various additions to the line of products being made, about 500 tons of iron being used every year, giving employment to forty hands. The firm of Small & Smyser carried on the business for nineteen years, and the firm was dissolved only by the death of Dr. Small. He was a well-known and highly respected citizen of York, and was most charitable in practising his profession among the poor and needy without expectation of reward. During the period that this co-partnership lasted, the works were again materially increased, and the products augmented in a corresponding ratio. After the death of his partner, E. G. Smyser assumed the direction of the establishment, of which he had become sole proprietor, and made still further additions, purchasing considerable property in the rear of the original works, so that they now cover nearly three and one-fourth acres of ground. The buildings thereon erected are the finest of their kind in the borough. The manufactures include castings from the weight of two ounces to ten tons. Among the principal articles made are iron house-fronts, all descriptions of mill machinery, bridge castings, jet and drinking fountains, rural ornamental work, such as imitations of the stumps of trees, iron vases, figures of animals, etc. This ornamental work commands a ready sale in New York and Chicago, to which points it is shipped as fast as it is manufactured. A contract is now (April, 1875) being filled for the cast iron and ornamental work required for the new double-deck iron truss bridge being erected over the Schuylkill river at Callowhill street, Philadelphia. The yearly consumption of iron varies between 2500 and 3000 tons, and the value of the articles manufactured during the same period is estimated at $250,000. About 140 hands are constantly employed; and, it may be remarked, that during the great business depression, commencing in the fall of 1873 and extending through 1874-'75, the works were uninterruptedly in operation. The proprietor is assisted in his many labors by his three sons, who have each a small interest in the business. They are all practical machinists, promising, industrious and energetic young men. One of these fills the duties of superintendent, etc., and another is the accountant of the concern.

EDWARD GEORGE SMYSER was born, 1820, in York, Pennsylvania, and received his education at the York County Academy. While still a youth, he entered a dry goods store, and was engaged in mercantile pursuits until he became identified with his present business. He takes an active interest in all measures tending to promote the welfare of the town. He is the Treasurer of the General Synod Branch of the Board of Home Missions and Church Extension of the Evangelical Lutheran Church in the United States.

PENNSYLVANIA AGRICULTURAL WORKS, A. B. Farquhar, Proprietor, York. The business was established, in 1858, by the firm of W. W. Dingee & Co., who operated them until they were destroyed by fire, in 1861; and as the policy of insurance had expired but a few days previous to the disaster, and had not been renewed, the loss was almost a total one. The present proprietor, who had had an interest in the business for two years previous, assumed the control of matters, and having stated the situation to the creditors of the firm, they agreed to grant an extension of two years. He accordingly bent his energies to accomplish the task of rebuilding and refurnishing the works, and started once more on an extended scale. At the expiration of the two years allowed by the creditors of the former proprietors, their claims were all paid off and the proprietor found himself

in possession of a thriving and rapidly increasing business, which has grown to mammoth proportions and comprises several industrial establishments grouped together and already the most perfect and extensive of their kind in the State. There are saw and planing mills, a foundry and machine shop, forging, shearing and polishing rooms, and a rolling mill is contemplated. Large building additions are to be made, and are now (April, 1875) in process of construction. Agricultural implements of every description are produced: horse powers, threshing machines, steel plows, cotton sweeps and scrapers, cultivators, cultivator teeth and all descriptions of agricultural steels. The weekly consumption of steel averages 10,000 pounds; and between fifteen and twenty thousand feet of the best lumber are used during the same period. The manufactures are shipped to all parts of the Union, Canada, South America, Europe, Australia and Africa; the largest shipment in January, 1875, was made to the latter continent. During the past ten years there has been an average annual increase of twenty-five per cent. over the business of the preceding year. The manufactory is located on North Duke street, being 150 feet in front, extending in depth 500 feet to George street, and the buildings cover nearly two acres. About 200 skilled workmen are employed, and the value of the different articles made reaches $500,000 per annum. When the improvements now in course of construction are completed, it will be the largest industrial establishment in York, and one of the most important of its kind in the world; indeed, it already has that reputation. The works have continued in operation during all the financial panics, and the business has not been effected thereby.

ARTHUR B. FARQUHAR was born, 1835, in Montgomery county, Maryland, and was educated at the Alexandria High School, Virginia. He learned his trade as a maker of agricultural implements at the above establishment, with a view to engage in the business in Maryland. After he had been with them a year he was appointed foreman of one of the departments, and on completing the knowledge of his trade was tendered a partnership, which he accepted, with the results already stated. He is now a large real estate owner, is warmly interested in all that tends to the prosperity of the town, and is a member of the Moral Committee of York. He is an ardent temperance reformer, especially among his workmen; he has written much upon the subject, and his essays have appeared in the columns of the New York *Tribune*. He was a warm personal friend of the late Horace Greeley, and like him is a liberal Republican in political belief. During the invasion of Pennsylvania by the rebel army, and when the latter captured the town, he made arrangements for the protection of property by meeting Generals Gordon and Early, and entirely accomplished his object. The papers signed on that occasion are now among the archives at Washington. He afterwards visited President Lincoln and Secretary Stanton, and was complimented by them for what he had done. He was never much in active service, but recruited several hundred men for the United States Volunteers. At the battle of Gettysburg he was under fire, taking charge of the wounded. In religious belief, he leans to the Unitarian Church, and there being no society of that character in town, he generally attends Friends' meeting.

HEY, BROTHERS & CO., Manufacturers of Woollen Yarns, Philadelphia. This business was established, in 1840, by Moses Hey, father of the brothers now conducting it, near the site of the present location of their works, at Springfield, Delaware county, Pennsylvania; he conducted it for many years. He was succeeded by his three sons, Emanuel, Joseph and Samuel Hey, who continued the business until 1869, when Samuel retired and James Wilde, one of their former employés, was admitted to the firm and is now the manager of the mills. The works comprise a factory, 200 feet by 40 feet, three stories high, a dye house, an outside picker house, a scour house, a dry house and an engine house; also forty tenements, occupied by their operatives, of whom there are 100 constantly employed. The goods manufactured are woollen yarns, in great varieties, for hand knitting, zephyr work, weaving, etc. The products of this firm have acquired a most enviable reputation all over the United States, owing very much to the fact that it has been their constant effort to maintain the superior quality of their yarns, both as regards color and durability; and such is the confidence of their patrons in this respect that their old customers never examine the goods, but give their orders by numbers, description and quantity required. In the line of fancy colors on zephyr yarns they are unexcelled.

MOSES HEY was a native of England, and came to the United States about 1816. He was

identified with woollen manufactures for a number of years in the vicinity of Philadelphia, principally at Manayunk. Subsequently he removed to Blockley township, and thence to Springfield, in Delaware county, where he founded the present works.

EMANUEL HEY was born, 1821, in the State of Massachusetts, and his parents came to Pennsylvania the following year, where he received his education. He worked in the establishment from boyhood to manhood, and on becoming of age was engaged in the business with his father. He has ever closely identified himself with his avocation.

JOSEPH HEY was born in Manayunk, and after leaving school entered the house of Henry Duhring & Co., as a salesman, where he remained until he engaged in business with his brothers. He now superintends the warehouse of the firm in Philadelphia.

JAMES WILDE is an Englishman by birth, nephew of James Wilde, a well-known manufacturer of former years. He is the junior member of the firm and superintends the works.

EAGLE SOAP WORKS, Pittsburgh, John H. Wilson, Proprietor, trading under the old firm-name of Wilson & Gorman. These works, which are the oldest of their kind in the western section of Pennsylvania, were established about the beginning of the present century, by John Jackson, who, after conducting the business for many years, was succeeded by his son, George W. Jackson. The latter afterwards sold his interest to George Wilson, his foreman, and William Gorman, his clerk. This firm, after a most prosperous business career, was dissolved by the death of William Gorman, in 1853. It built up the business to its present proportions, and was always in high commercial standing. At one time it was extensively engaged in the manufacture of candles for the Lake Superior copper mines, and had for a long period a thriving trade in that region. At present its trade, though very large, is almost entirely local, and the manufacture of candles is about abandoned. George Wilson, who was much esteemed both in social and commercial circles, died in 1871. Since that time his son, John H. Wilson, has been the sole proprietor and manager of the business, but in consequence of the high reputation of the old firm the name has never been changed. The annual product amounts to about 700,000 pounds of soap, and there is a steady and increasing demand for every pound manufactured. This demand also is steady and enables the full force of workmen to be kept busy throughout the entire year. The factory is situated at the corner of Fourth avenue and George alley. Extensive improvements and additions are contemplated to meet the increasing trade.

GEORGE WASHINGTON SNYDER, Machinist, Car Builder and Coal Operator, was born in Philadelphia, where he was indentured as an apprentice in the well-known establishment of Rush & Muhlenberg, and remained until he attained his majority. He removed to Pottsville in 1835, and in 1850 became sole proprietor of the works formerly owned by Haywood & Snyder, and has so continued to the present time. He had a contract for thirteen years to build and repair the cars belonging to the Schuylkill Navigation Company, and during this period the number constructed was over three thousand. During this time also he was the heaviest (individual) coal miner in that section, employing no less than seven hundred hands. In the machine shop, which he still conducts, and which has of late years been largely increased in extent, he manufactures mining engines, pumps and the machinery required in coal mining operations. The number of hands is about one hundred and seventy-five, and the yearly products average in value a quarter of a million dollars. Personally, he is of a quiet, retiring disposition, the possessor of a fortune, respected as a good citizen, liberal and charitable in all matters pertaining to the public weal.

SIMEON GUILFORD, Civil Engineer and Iron Master, was born near Northampton, in Hampshire county, Massachusetts, in the year 1801. He was the youngest son of Simeon Guilford, Sr., who had served in the Revolutionary army for six years, and after its close had been engaged in the vocation of a teacher. Simeon, the younger, when he reached the age of fourteen, realized the necessity of assisting his parents; he soon had the ability, and availed himself thereof, to make their declining years happy. His mother had numbered eighty-three years at her death, and his father reached the patriarchal age of ninety-three. Previous to 1823, he was engaged as Engineer on the Erie Canal, then in process of construction, but at this date he

went to Pennsylvania and became principal assistant to Canvas White, the Chief Engineer of the Union Canal. By a happy accident he discovered a superior route to that already selected, which greatly diminished the cost of the work by affording a better water supply, and by diminishing the waste of water or leakage occasioned by the interstitial character of the limestone region. He was also able to provide a superior hydraulic cement, manufactured from an argillaceous limestone which he had discovered on the line of the work, and which was used on the same, saving to the company many thousands of dollars. In consequence of this important service rendered the company, he was presented by them with a copy of Rees' *Cyclopædia*, 46 vols. 4to, and a complimentary resolution. In 1827, he accepted the appointment of principal Engineer in the service of the State, tendered him by the Board of Canal Commissioners. His first work, in this connection, was to survey the route for a canal from Clark's Ferry, on the Susquehanna, to Northumberland. In the short space embraced between May 31st and June 26th, 1827, he surveyed both sides of the river, locating, plotting, estimating and reporting seventy-nine miles of canal, besides side-levels, alterations, etc., amounting to fifteen miles more, and also determining the locality of a dam of 2200 feet across the river near Sunbury, a bridge of the same dimensions at Duncan's Island, and a dam and inlet lock at the mouth of Penn's Creek at Selinsgrove. Before leaving the line he was tendered by the citizens and contractors a public dinner, at which he was presented with a pair of silver pitchers, with an appropriate inscription. On various occasions he was called upon to make surveys, locate, and render estimates of proposed improvements; among these the Conestoga river, the Codoves creek, locks and dams; a similar work on the Rancocas creek, New Jersey, and the Sandy and Beaver canal and reservoirs, Ohio. Between 1825 and 1832, he discovered the celebrated Chestnut Hill iron ore on the Greider farm, near Columbia, Pennsylvania, which he owned for some years; also three other fine deposits of hematite ore in Lebanon county, now being worked, and also others of less importance. In 1830–'31, in partnership with the late Dr. George N. Eckert, he erected, in the Swatara valley, in Schuylkill county, the "Swatara Furnace," for the manufacture of iron by charcoal. Here pig-iron, besides castings—such as stoves, water-pipes, etc.—were produced in considerable quantities, and the establishment remained in operation for twenty-two years. In 1853, for sundry good reasons, the partnership was terminated and the works abandoned. In 1855, in connection with others, he started a blast furnace at Lebanon, using anthracite coal as a fuel, and the "Cornwall ore." This was known as the "Dudley Furnace," and is now operated by the heirs of Robert W. Coleman, and termed the "Donoghmore Furnace." Since he retired from the iron business, he has given his attention to his Illinois properties. In 1843, he received the nomination of the Whig party as Canal Commissioner, but failed to be elected. He was married May, 1830, to Catherine E. Doll, a niece of Judge Andrew Graff, of Lancaster, and has three children living: Dr. W. M. Guilford, of Lebanon, Pennsylvania; Dr. S. H. Guilford, dentist, of Philadelphia; and Robert E. Guilford, merchant, Shelbyville, Illinois. His wife died October 8th, 1858.

ELI SLIFER, Manufacturer of Agricultural Implements, and ex-Secretary of the Commonwealth, was born in Coventry township, Chester county, Pennsylvania, in 1818. He was left an orphan at an early age, without fortune or influential friends, dependent only on his own energies. In 1834, he was apprenticed to the hatting trade in Lewisburg, and served his time, afterwards continuing as a journeyman in the same calling for three years. His leisure hours were devoted to reading and study, and he acquired a fair amount of knowledge, although previously deficient in even the rudiments of an English education. In 1841, he removed to Northumberland, Pennsylvania, and engaged in the boat building business. In 1845, he returned to Lewisburg, and, in partnership with William Frick, established the same business on a larger scale, subsequently adding the manufacture of lumber. The firm of Frick & Slifer became well known in commercial circles, gave employment to over 100 men, and was quite successful, so much so that after some years Eli Slifer retired with a reasonable competency. Subsequently, and with several others, he became interested in a foundry and machine shop for the manufacture of agricultural implements, in which business he is still engaged. In 1848, he first participated in political matters as a leader, and displayed a high measure of ability in the public discussions in favor of the principles and candidates of the Whig party. In 1849, he was unanimously nominated as the Whig candidate for the Legislature in the district now composed of Union, Snyder, and Juniata counties, and was elected by a decided majority. His legislative career was so heartily approved that he was renominated and re-elected by an overwhelming

majority. In 1851, he was selected as the Compromise candidate for the Senate, each county in the Senatorial district having put forth a candidate. He was elected without opposition, and that in a district which was successfully contested by the Democratic party the same year for important offices, a fact indicating the universal confidence reposed in him by the people of all political faiths. In 1855, he was elected State Treasurer, but retired in 1856, his party being in the minority. In 1859, the first Legislature in which the Republicans predominated, he was again elected State Treasurer, and re-elected in 1860. In January, 1861, four months prior to the close of his term, he resigned to accept the important office of Secretary of the Commonwealth, under Governor Curtin, which position he held during the war, and to the close of the Governor's second term, in 1867, when he retired with his health irretrievably shattered, and has since sought rest. He passed nearly a year in Europe, going on a Government vessel by invitation of the National authorities. The services he rendered his State during the Rebellion were excessively arduous, exacting and untiring, and all were performed with notable unselfishness and a patriotic devotion to the public weal. Since his retirement he has not been able to participate actively in political matters, although, in the fall of 1872, he delivered an address to his neighbors in defence of Liberal Republican principles. He is a man of rare unobtrusiveness, never seeking office, and only accepting the positions he has filled when tendered to him. He was married, in 1840, to Catharine Frick, of Northumberland.

BERGNER & ENGEL, Brewers of Lager Beer, Philadelphia. This brewery was founded, in 1849, by Charles W. Bergner, the father of the present first partner. The brewery proper was on Seventh street below Girard avenue, and the part of the present site then occupied was used merely as storage vaults, having a capacity of about 1000 barrels. In 1852, Gustavus Bergner took charge of the brewery founded by his father, and, in 1857, he removed it to its present site. The business was then of but small extent, and was comprised in one building. The number of hands employed was twelve only, and about 7000 barrels of beer were brewed per annum. From this nucleus the business of this house has grown until its transactions are so extensive as to be surpassed by only two breweries of lager beer in the United States. The second partner, Charles Engel, about 1844, carried on a brewery in Lewistown, Pennsylvania, and subsequently came to Philadelphia, and, in conjunction with Charles C. Wolff, established a brewery at Fountain Green, under the style of Engel & Wolff. This brewery was sold, in 1870, to the Park Commissioners, and in the same year, Gustavus Bergner and Charles Engel entered into partnership, thereby uniting the trade of the two breweries. The ground now (1875) occupied by this firm includes three and a half acres, two and a half of which are owned by the firm, and the remaining acre rented. The brew house is a stone building, 60 by 100 feet, and four stories high. It contains two mash-tubs, one of which is sixteen feet in diameter, and of the capacity of 300 barrels, and the other thirteen feet in diameter, and of the capacity of 250 barrels; an iron tub large enough to hold the contents of both mash-tubs; two kettles of the capacity respectively, of 150 and 110 barrels, in which the "wort" (as the fluid extract of malt is called) is mixed with hops, and boiled; a hop-jack of the capacity of 250 barrels for straining the beer from the hops; a hop-press for further straining the hops; the steam engine of thirty horse power; together with all other necessary working gear, such as malt bins and mills, steam pumps, storage rooms for hops, fermenting rooms, water tanks, etc. In this part of the brewery is an artesian well, 550 feet deep, the water of which, naturally cold and made still colder by ice, is used for cooling the beer by means of a patent cooling apparatus. This latter consists of a copper pipe, of two and a half inches in diameter, bent back over itself several times and held by iron framing in an upright position, thus forming an extended surface. The ice-cold water from the well is forced upward through this pipe, and the beer is allowed to flow down over the outside, being received in a vessel at the bottom. Seventy barrels per hour can be passed over this apparatus, by which means the beer is reduced to a temperature of thirty-eight degrees. This cooling apparatus is only required in warm weather, the surface coolers being sufficient in winter time. The ice-house and refrigerating store-rooms are situated in a building which has recently (1875) been enlarged. It is 75 by 110 feet in extent, and 80 feet high; and is surmounted by a tower which rises to the height of 100 feet. Here are the ice-chambers, surface coolers, and three vast storage rooms. The walls of this building are more than five feet thick; the outer brick walls being supplemented by an inner wall or "studding" of two feet in thickness, in which is contained a row of

wooden pillars. Between these two walls are layers of felt, and heavy water-proof paper, in order to make the walls non-conducting, and to retain as much as possible the cooled air from the ice. The ice-chamber is situated on the third floor of this building, and will hold 1600 tons of ice. This immense weight is sustained by forty-five heavy columns of yellow pine, which run through the building from top to bottom; thus relieving the outside walls of the weight, and obviating all danger of collapse. The storage rooms consist of the first floor chamber, which is 103 by 64 feet, and 15 feet high, another room above this which is 10 feet high, and the vault underneath, also of large dimensions. These rooms will contain over 15,000 barrels. The floors of these rooms are covered with an artificial stone called "Lithogen stone," which is formed in one continuous piece without joint, and is absolutely impervious to water. Over the ice-room are the "surface coolers," which are of the extent of 56 by 82 feet, made of sheet-iron, and form, as it were, a huge shallow pan. They are placed at this great elevation in order to get the utmost quantity of air, which is freely admitted through galvanized iron shutters, turning on pivots. The beer is pumped into these coolers from the hop jack in the brew-house on the opposite side of the premises, to the depth of about two inches—so as to expose as much surface as possible to the cold air—and allowed to remain there until sufficiently cooled. If necessary, it is then further cooled by being passed over the cooling apparatus before mentioned. There is also on the outside of this building a new patent machine, worked by a small separate steam engine of ten horse power, for elevating ice and conveying it quickly into the ice-houses. This machine will unload and stow in the ice-houses 300 tons of ice per day. Adjoining this building is another 45 by 120 feet, containing three fermenting rooms. In these are about 150 vats. There are also other chambers in the brewery reserved for fermentation, the total number of fermentation tubs being 250, of the aggregate capacity of 10,000 barrels. The whole vaults used extend 1750 feet in length by 22 feet in width, and are 14 feet high; they will hold 1500 casks of the average capacity of about thirty-five barrels each. There are also, in different parts of the premises, a number of miscellaneous buildings and workshops, incidentally necessary to the trade. Such are—a cooper shop, for making barrels and kegs; a resining furnace, which furnishes heat to a coil of pipes in which steam is superheated, by which means the kegs undergo the process of resining; a blacksmith shop, for repair work, horse-shoeing, etc.; and the stables, which are capacious and substantially constructed, and extend 30 by 200 feet. The quantity of hops consumed by this house amounts yearly to 1600 bales, each bale weighing about 200 pounds. Of this quantity about one-fifth is imported from Bavaria and Bohemia. The imported hops are generally more carefully prepared than, and somewhat superior in flavor to, American-grown hops. Of malt, 250,000 bushels are used per annum. The supply of ice required for the business yearly is 10,000 tons. The stock of kegs for the supply of the trade is 20,300, and between fifty and sixty horses, with a proportionate number of wagons, are employed in delivering beer and hauling supplies. For the latter purpose —the hauling of supplies—many outside teams are also frequently used. The number of men employed by the firm is 100, and the total annual production is nearly 90,000 barrels of beer, or about 2,700,000 gallons.

ECLIPSE STEAM GENERATOR MANUFACTURING COMPANY, Kilgore & Bollman, Proprietors, Sharpsburgh, Allegheny county. These works were founded, in 1872, by J. C. Kilgore and G. W. Bollman, for the purpose of manufacturing the "Eclipse" Sectional Boiler, which is the invention of the former gentleman. During the time the establishment has been running, the firm have built a large number, and have introduced these boilers successfully in nearly every State and Territory of the Union. The Eclipse steam generators, which form their specialty, are guaranteed to be entirely secure from destructive explosion; they occupy but a small space, and consume but a small amount of fuel. They are easily cleaned and repaired, and are deemed a safe and economical boiler. The works are running to their full capacity, giving employment to thirty-five hands, including blacksmiths, moulders, and machinists. The firm have an office at No. 87 Wood street, Pittsburgh.

JOHN CORNOG, Iron Master, Wallace township, Chester county, was born, September 18th, 1808, in Radnor township, Delaware county, Pennsylvania, and is of Welsh and Swiss ancestry. His education was only that obtained in the ordinary country school. When but eighteen years old, he went to Philadelphia, and engaged in the marble business as the senior member of the firm of Cornog &

Jacobs, which carried on from the start an extensive business. His quarries were located in the Great Chester Valley, and also at Sheffield, Massachusetts. He furnished all the heavy marble for the United States Custom House at Boston, the Bank of West Chester, the Girard College, and many other prominent edifices in the country. He continued in this business with great success until his fortieth year, when, desiring a change, he purchased a large and valuable farm property in Wallace township, whereon he now resides. In 1857, he formed a co-partnership with the late Hon. A. R. McIlvaine—member of Congress from the Seventh district of Pennsylvania—under the firm name of Cornog & McIlvaine, for the manufacture of iron. The business was conducted at Springton Forge, in Wallace township, and where it is still continued under the same style and name, though his partner has since died. In 1860, he was the originator of the railroad, since constructed between Downingtown and Waynesburg, laboring most zealously to convince the people of that agricultural section of its vast importance to their interests and prosperity. The company was organized, and in appreciation of the services he had rendered the project, he was elected President of the corporation, a position he has ever since held. Under his supervision the road was constructed and completed in 1861. In 1872, he originated the idea of further extending the road to New Holland, in Lancaster county, ten miles distant from the terminus at Waynesburg, and through his influential exertions sufficient funds were secured to warrant the commencement of the enterprise. He was married, December 27th, 1831, to Eleanor Van Leer, of Delaware county; and, after her death, was a second time married, January 7th, 1846, to Sarah D. Sharpless, of Downingtown, Chester county.

BAYLISS & DARBY MANUFACTURING COMPANY, Manufacturers of Wire Work, Philadelphia. This large and thriving establishment was originated by Joseph Bayliss and Edward Darby, who, in 1854, with a staff of one man and a boy, commenced the manufacture of wire work on Arch street, just above Front, in premises consisting of a store and basement, measuring 18 by 40 feet. Soon after starting, Thomas H. Linn was admitted to a partnership; but he was connected with the establishment only a short time. Five thousand dollars is the estimated value of the produce during the first year. This was succeeded by steady expansion; so that in 1858, the business had so increased as to need more extensive premises. Accordingly, a removal was made to 226 Arch street, where the firm was attended by prosperity till 1866. In this year, Bayliss & Darby embarked in another enterprise—ale and porter brewing—which did not prove successful, the brewery being situated too far from the city to receive their personal superintendence. Although suffering great loss, the firm were enabled to pay 100 cents in the dollar; and then proceeded to work at their old business with renewed energy. In 1868, the establishment was removed to the building at present occupied, No. 231 Arch street. This manufactory is five stories in height, with a frontage of 18 feet and a depth of 75 feet. Here are employed about thirty hands, and the produce of each year has grown to an average of $65,000. Every branch of the manufacture is now embraced in this establishment, from the smallest to the heaviest texture; and the catalogue of articles produced extends over many pages. Iron railing, iron bedsteads, all kinds of garden furniture, sieves, riddles, and screens, are among the principal products.

JOSEPH BAYLISS was born in Birmingham, England, where he learnt the trade of wire working. He came to this country in the spring of 1846; and worked in the establishment of Joseph A. Needles, on Front street, Philadelphia, till originating his present enterprise, in 1854.

EDWARD DARBY is also a native of Birmingham; and was born May 1st, 1822. He there learnt the trade of wire working; and came to this country in 1846, six months after Joseph Bayliss. He worked in the establishment of Watson & Cox, of Philadelphia, till 1854.

KAUFFMAN FURNACE, Christian S. Kauffman, Proprietor, (near) Columbia. This furnace was erected by Cross & Waddell, a western Pennsylvania firm, in 1846, and shortly after going into operation was purchased by Brian & Longenecker. In 1854, the property was again disposed of to the firm of Kauffman, Shaeffer & North. Under this proprietorship the works were partly destroyed by fire, but were rebuilt. After some time had elapsed, Kauffman & Shaeffer purchased the interest of Hugh M. North; the latter is now a prominent

member and leader of the Columbia bar. In 1864, General Bartram A. Shaeffer died, and in the following year C. S. Kauffman purchased from the heirs the interest of his deceased partner. Some time after obtaining sole control, he rebuilt and enlarged the establishment, rendering it complete in every department, and introducing all the most approved appliances, in order to enable him to produce the best qualities of iron. The works are located on the line of the Reading & Columbia Railroad, about three miles distant from Columbia, and near the celebrated Chestnut Hill ore banks. The ore smelted at this furnace comes chiefly from York county. The stacks are 37 feet high, and the boshes 14 feet in diameter. The average annual product is about 6000 tons of pig-iron, which finds a market as far west as Pittsburgh, and Portland, Maine, in the northeast. At the ore banks and furnace there are about 100 hands employed.

COLONEL CHRISTIAN S. KAUFFMAN was born, June 12th, 1826, in Manor township, Lancaster county, Pennsylvania, and was educated in the common schools of his native county. When ten years old he entered a country store, where he remained for three years; but his health beginning to give evidence of failing, he returned to his father's farm, and aided in the routine duties of home during the summer, attending school in the winter months. When sixteen years old he again entered the store he had quitted, where he continued for two years, and then engaged in mercantile business on his own account. In 1849, he disposed of his establishment with the view of emigrating to California, but finally concluded to remain in the East, and resumed, early in 1850, his mercantile pursuits, which he prosecuted in Columbia until 1854, when he purchased, in company with his partners, the furnace now bearing his name. In 1856, he was elected to the State Legislature, and served for one term with credit to himself and full satisfaction to his constituents. He is President of the Borough Council, and takes an active interest in local and State affairs. He was a Delegate to the National Convention at Chicago which nominated Abraham Lincoln to the Presidency, and has been several times mentioned for the Republican nomination for Congress in his district. He was appointed by Governor Pollock one of his aides, and thereby received the rank of colonel. He has contributed much towards the development of that section of the county where he resides, especially as regards railroad enterprises, being one of the principal promoters of the Reading & Columbia Railroad Company.

WOOL HAT MANUFACTORY, John, George, and Henry B. Hendel, Proprietors, Reading. This establishment dates from the year 1871, when it started in the buildings formerly known as the Wyomessing Woollen Mills, situated at the terminus of South Fifth street, Reading; the property being, at that date, purchased from Charles H. Brooks, of Philadelphia. The new proprietors erected the proper machinery for the purpose of manufacturing wool hats, and the amount of capital primarily invested was $50,000. When the works went into operation they employed eighty hands, male and female, and at the expiration of the first year had produced 26,000 dozen hats. During the second year this number was increased to 35,000 dozen; and at the end of the third year the amount was proportionately augmented. The number of hands at present employed is about 130, and the present capital invested is about $100,000. The great success which has so far attended the firm is due to the fact, that they are practical men, thoroughly acquainted with the business; and to the maintenance of steady, and at the same time energetic administration of their operations.

JOHN HENDEL was born, December, 1833, in Adamstown, Lancaster county, Pennsylvania, and is a son of the late Levi and Susan (Bollman) Hendel. After receiving a fair education, he became interested in his father's business, who was a hatter by trade, and, when only sixteen years of age, was sent to Philadelphia to purchase goods. He had charge of his father's establishment until the second marriage of the latter, when, with his brother, he started in business at Reading. He was married, in 1853, to Catharine Stieff, of Adamstown, and is the father of eleven children—nine sons and two daughters—eight of whom are yet living. He is a steady and thorough business man.

GEORGE HENDEL was born, 1835, in the same town as his brother John, and his career has been almost identically the same.

HENRY B. HENDEL was born, April 21st, 1843, in the same place, where he went to school for a time, and completed his education at Millersville. He was likewise engaged with his father in the hat business, his charge being that of travelling agent of the house for a considerable period. After his brothers dissolved partnership with their father, he continued with the latter for three years and until his death. He then removed to Reading, where he purchased a factory at the corner of

Eleventh and Spruce streets, which he operated for a short time. He was also a part proprietor of another factory at Mohrsville, and the latter was operated by him while he was still engaged at Adamstown. On joining his brothers John and George, he disposed of his factory at Eleventh and Spruce streets, Reading, but retained the one at Mohrsville, which is now operated in connection with the present extensive one belonging to the three brothers. He is connected with several orders in the section where he resides, being a member of five separate lodges.

FRANKLIN FOUNDRY, MACHINE, AND CAR WORKS, Shaaber, Johnston & Co., Proprietors, Reading. The Franklin Foundry was established by Adam Johnston in 1840, the first casting being made February 22d, 1841. The original building was a one story brick structure 25 by 59 feet, with an engine house attached 14 by 28 feet, in which was an engine of five horse power, a small lathe, and a few tools. The principal work then consisted in furnishing castings for agricultural works. The number of hands then employed was but seven, including two apprentices, and the value of goods produced was but small. As most of the products were disposed of on credit, and he lost a considerable amount of money by the subsequent failure of his customers, the enterprise suffered materially soon after its commencement. He, however, persevered, and overcame these obstacles. In 1844, he made 400 iron coal cars for the Philadelphia & Reading Railroad Company. The present casting house was erected in 1854, when the old building was converted into a machine shop, and a second story added to accommodate the pattern shop. A frame car shop was added to the works, in which, during the war, a large number of cars were built for the Government. This building was destroyed by fire in 1868, when the present substantial brick structure was erected. The foundry and shops (excepting the car shop) are located on a piece of ground 230 by 297 feet, at the southeast corner of Eighth and Chestnut streets. The car shops are built on a lot 162½ by 230 feet, on the west side of Eighth street, between Chestnut and Bingaman streets. The machine shop is 83 by 58 feet; the fan house 50 by 27 feet; the foundry proper 107 by 50 feet; the blacksmith shop 103 by 30 feet; and the car shops 56 by 96 feet. All the buildings are of brick, and the machinery and appliances contained therein are calculated for nearly all descriptions of machine and foundry work. Among the tools is a machine which will plane 5 feet wide and 16 feet long; also a lathe which will turn a shaft 27 feet long. The machine shop is complete in its line of tools, including a punching machine capable of forcing holes through iron of an inch thickness. The foundry is supplied with a strong steam crane with engine attached for heavy work. There is also here a pit, upwards of 7 feet diameter and 15 feet deep, for casting hot blast pipes, long columns, and shafts on end, giving them almost the strength of wrought-iron. There are two cupolas for the melting of iron, with a joint capacity of fifteen tons; also one of the Lawrence patent, capable of melting ten tons in one hour. The machinery for the entire works is driven by a forty horse power steam engine. In the fan house are two fans to furnish the blast for the cupolas, and one other communicating with the smith fires, which are located 100 feet from the fan. The pattern shop is filled with a vast number of designs, the accumulation of many years. When the works were first put into operation steam engines of ten to thirty horse power were erected: the majority of those built at the present day range from 100 to 300 horse power. There have been as high as 200 hands employed, but the average number is about 125. The capital at present invested is $50,000. These works have turned out within a few years past a number of engines for the Phœnix Iron Company, including mining and pumping engines. The hot blast pipes, columns, etc., for the Pennsylvania Steel Company, at Baldwin's Station, were cast here, and a large number of engines for blast furnaces, rolling, grist, and sawmills, mining machinery in various parts of the country; including a "Thomas Patent Ore Washer" for the LaGrange Iron Company, of Danville, Tennessee. The founder of these works remained their sole proprietor for over a quarter of a century. In 1867, the present co-partnership was formed, Henry Johnston and Daniel Shaaber being associated with Adam Johnston, under the firm-name of Shaaber, Johnston & Co. The General Superintendent is Andrew Shaaber, nephew of Daniel. Peter Price is foreman of the machine shop; Henry Eisenbeis foreman of the foundry; Andrew Shaaber foreman of the pattern shop; John Shaaber foreman of the blacksmith shop; and William Fritz foreman of the car shop.

ADAM JOHNSTON was born, June 19th, 1807, near Hopewell Furnace, Berks county, Pennsylvania, and is the son of Adam and Maria (Cox) Johnston, and was educated in his native county.

He was apprenticed to his father to learn the moulding business, in Long Swamp township, Berks county, and remained with him until within six weeks of his attaining the age of twenty-one years: for those six weeks he paid his father sixty dollars. He followed his trade until 1840, when he started a small foundry about three miles from Reading, where he remained one year, and then removed to the site of his present works in the autumn of that year, and commenced the erection of the foundry. He served one year (1844) as Councilman of the city, being elected by a large majority, though belonging to the minority party —radical Whig. He was married, November 2d, 1828, to Hannah Schisler, of Lehigh county, Pennsylvania.

DANIEL SHAABER was born, December, 1832, in the city of Reading, Pennsylvania, where also he was educated. He learned pattern making under his accepted father, Adam Johnston, and when the latter retired, he associated himself with Ezekiel Jones, and carried on the manufacture of iron moulding. In 1867, he again became interested in the business of Adam Johnston, which resulted in the present co-partnership. He is a School Director in the city of Reading, and is of the Republican creed. He was married, 1859, to Aseneth, daughter of Adam Johnston.

HENRY JOHNSTON was born, August 25th, 1829, in Heidelberg township, Lehigh county, Pennsylvania, and is a son of Adam Johnston, the founder of the works. He was educated both in Reading and Germantown, closing his studies at the Lewisburg Seminary. When twenty-two years of age he began as clerk in his father's establishment, and so continued until 1867, when he was associated as a member of the firm of Shaaber, Johnston & Co. He was married, June 1st, 1854, to Emeline, daughter of John Hoff, banker, of Reading.

KEYSTONE FURNACES, Bushong & Co., Proprietors, Reading. These works were projected, in 1868, by the present firm, and a furnace erected. During the year 1872, a second was built. They are located in the city of Reading. The height of each stack is 50 feet, and the diameter of the boshes is 14 and 15 feet. The ores reduced are the magnetic and fossil hematite, and the average amount of product is given as 16,000 tons of pig metal per annum.

HENRY BUSHONG, senior partner of the above firm, was born, March 25th, 1826, in Lancaster county, Pennsylvania, and is the second son of Philip Bushong, of Lebanon county. He was educated at the Litiz Academy, where he remained until twelve years of age, when he went to work. In 1846, he entered his father's distillery, obtaining an interest in the business, in which he continued until 1863, when the law regulating the distillation of spirits went into operation. The enactments of this law were so stringent that he believed himself under the necessity of abandoning the manufacture or of defrauding the Government. He chose the former, and then entered into the banking business, in partnership with his brother Jacob, establishing the house of Bushong Brothers, of Reading, so widely known throughout the State. In 1868, he embarked in the manufacture of pig-iron, as stated above; and, in 1871, became extensively interested in paper making, and has a large amount of capital invested in that enterprise.

J. BARTON SMITH & CO., Manufacturers of Files, Shoe Rasps, etc., Philadelphia. This house was established, in 1842, by the late J. Barton Smith, in the city of New Haven, Connecticut, where he remained for comparatively a short period. Some three or four years after he removed the concern to Philadelphia, where the house has eminently prospered. He located originally at No. 221 New street, whence he removed to the present location, No. 211 New street. In 1872, he associated himself with Charles F. Cripps and E. Winslow Coffin, under the firm-name of J. Barton Smith & Co., and the house at once assumed greater proportions, new enterprise was manifested, and the system of conducting affairs adopted added to the prominent position the business had already secured. The first named of these two gentlemen has been connected with the establishment for nearly twenty-five years, in one of the important processes of manufacture, and his wide experience has been of the most valuable service, as he employs all his individual skill to bring the manufacture of files and rasps to the highest appreciation of all dealers. The second of these new associates, though not practically engaged in the manufacture, is thoroughly acquainted with all its details, and conversant with the business in every particular: his services are devoted to the financial business of the establishment. This is the largest manufactory of shoe rasps in any country, and the duties apper-

taining to the trade are consequently of no small moment. The senior partner died in January, 1873, when the remaining partners succeeded to the business. The firm have their manufactory at No. 23 Haydock street, where they make shoe rasps, files, etc.; also gas-plyers and gas-tongs. In making these articles, they use the best Sheffield steel, which they import direct. The process of manufacture is intricate and peculiar, requiring the greatest and most careful manipulation in every stage. The popularity of the shoe rasps has induced unscrupulous persons to import from Europe a worthless imitation, which is strong evidence of the superiority of the manufacture of this establishment. The house does the largest business in re-cutting files of any in the city, these articles being received from all parts of the country for that purpose. The trade in their products extends to every portion of the Union.

ISAIAH L. CRAGIN & CO., Soap Manufacturers, Philadelphia. This business was established in 1867. The factory is situated on Germantown avenue and is very extensive, comprising five lots, or an extent of 347 feet on Germantown avenue and the same on Marshall street, and is four stories high. The production of the firm is confined principally to the making of the soap known as "Dobbins' Electric Soap." The recipe for the manufacture of this soap was brought to this country by a poor Frenchman, who had discovered the secret which has proved so valuable. Having no means to prosecute its manufacture, he sold, for a trifling sum, the information and right to use it to John B. Dobbins, of Philadelphia, who began its manufacture in a small way. The business grew very rapidly, and in the course of a year or two it became necessary to employ a commission house for the effective carrying on of the trade. The house selected was that of I. L. Cragin & Co., in whose hands the business grew greatly. Subsequently, the value of the invention having been clearly proved by them, this house negotiated with J. B. Dobbins for the purchase of the business. Finally they bought the secret and the right to manufacture, paying to J. B. Dobbins $50,000 for the information which he had so cheaply acquired, adding to his knowledge all the chemical skill that they could obtain. Since their becoming possessed of the business, it has increased enormously. Having faith in the intrinsic value of their product, they advertise it largely in every State of the Union, their advertising contracts amounting yearly to about $100,000. This soap, in addition to the demand for it for domestic purposes, is largely in request for manufacturers' use. Woollen and other mills, for the manufacture of textile fabrics, can as little dispense with soap as they can with wool. The Boston branch of this house supplies this soap to nearly all the prominent calico printers, carpet, cassimere, flannel, worsted, silk and shawl manufacturers of New England, and the sale of it is equally large in other States, especially Pennsylvania. The firm have a toilet soap department, from which soaps are turned out that compete successfully with the best imported. The goods of this house are also exported largely to England, France, Spain, Cuba, Brazil and Canada.

MORRELL BANK LOCK COMPANY, Nathan Hilles, President; Joseph Schell, Treasurer; Harry D. Schell, Clerk; Philadelphia. This company was chartered, in 1873, with a capital of $300,000, of which $60,000 was given to the corporation as the working capital. The business for which it was organized is the manufacture of the lock invented by Thomas B. Worrell, who was occupied ten years in perfecting it. He designed a lock which it would be utterly impossible to pick, but found impediments in his way, which, after repeated attempts, he was enabled to overcome. His second conception realized his wishes, but the article was clumsy; the idea, however, received an honorable mention from the American Institute, New York. For the third design, exhibited in 1872 at the exhibition of that society, he received the bronze medal; and the following year they awarded him the silver medal of the institute. At that fair he had exhibited a lock and offered to pay $2000 to any one who should pick it. It was operated upon by James Sargent, of Rochester, New York, the most accomplished lock-picker of the times, who occupied twenty-one working days, averaging seven hours each, and failed. The lock was unassailable. In the following year, by the introduction of a plate, the invention was revolutionized, and its value was considerably enhanced, inasmuch as it was rendered completely impenetrable.

THOMAS B. WORRELL was born, 1819, in the village of Frankford, now a portion of the consolidated city of Philadelphia, and attended the

Friends' school there for about five years. He was never apprenticed, but undertook to learn several trades, which, however, he did not follow for any length of time. Having a taste for music, he cultivated it and became a teacher. This he relinquished and engaged in the grocery business, and subsequently conducted a bakery. In 1851, he was appointed Crier in the Court of Nisi Prius. He had for a long time been convinced that it was possible to invent a lock which would be proof against attacks of burglars, and resolved to attempt it. He had no knowledge whatever of mechanics, never having even entered a shop; but he succeeded, in spite of these drawbacks and deficiencies; he made wooden models himself, and with the result already detailed.

NATIONAL LOCOMOTIVE WORKS, Dawson & Baily, Proprietors. These works are located at Connellsville, Fayette county, and were founded, in 1871, by J. Y. Smith and George F. Dawson, who conducted the business under the firm-name of Smith & Dawson. In the autumn of the same year, M. Baily became a partner, when the style was changed to Smith, Dawson & Baily. In the spring of 1872, the senior member withdrew, and the firm assumed its present title of Dawson & Baily. Starting on a small scale, the capacity of the works has been steadily increased to the present time, and arrangements are being made to double them in extent by the erection of a new building, 150 by 50 feet in dimensions. The character of their products embraces all descriptions of railroad locomotives, but their specialty is the light and narrow gauge engine. It has been their constant aim to establish a reputation for superior work, and this object has been secured by employing only the very best mechanics in their shops. Many important improvements in the construction have been invented in their works; prominent among these are the fire doorway, the invention of their able assistant, James Connelly, and the improved gusset. Engineers have long felt the want of a "fire door" which could be constructed with the requisite amount of strength and uniformity. This new and superior "fire door" combines economy, strength and durability in a far greater degree than has yet been obtained. It is more simple in construction, having only one circular seam of rivets, and that outside of the line of the bulkhead, away from the direct action of the fire, which makes it far superior to any other. It is much cheaper and easier made, and any repairs which it may require can be much more easily done, as it is entirely under and within the immediate access of the workman. The new and improved gusset, or connection with this superior fire door, fills the measure of progress in this very important branch of mechanics. It is made of but one plate, and having but one variegated seam, and that on top above the water-line, is placed far in advance of any of the old kind, composed of two or more pieces and having their seams in the water-line—a radical defect—and one which cannot be avoided in the old and imperfect methods. This is the evil which many of the ablest mechanical minds have been laboring to overcome. To build the steam boiler uniform, and without seams, is their great hope, knowing as they do that until this is accomplished it must certainly remain defective. This gusset being laid out or marked off by the skilled workman, like any of the other shell-courses, makes it at least fifty per cent. stronger and cheaper, a fact that must be obvious to all, and one of the first importance to the manufacturer, the purchaser and the public. Both these inventions have been protected by letters patent. Every part of the engine is made in their own shops, which contain a full line of the most approved tools and machinery. The foundry contains a cupola with a melting capacity of five tons, and a large crane. In the blacksmith shop are nine fires; heating furnaces, steam hammer, punch and rolls. The engine and boiler house measures 24 by 12 feet, and contains a fine engine which propels the machinery. Among the machinery may be mentioned four drill presses, one 26 feet planer, one slotter, one boring mill for boring cylinders, one wheel lathe 8 feet in diameter, one 56-inch axle lathe, one gear cutter, ten lathes, one shaping machine, three planers, one saw, one milling machine, etc. The polishing room contains two grindstones and four sets of polishing wheels. The pattern room is on the third floor and contains one wood planer, one circular saw and two wood lathes. The firm manufacture on an average thirty-six engines per annum and employ 150 hands. Their patrons are principally Western railroad companies; among these may be named the Galena & Southern Wisconsin, Wyandotte, Kansas City & North Missouri, the Denver, South & Pacific and the Cairo & St. Louis. A locomotive built by this firm for Salt Lake City, Utah, during 1873, was of a peculiar character and calculated to run on a road which, at places, had a grade of 500 feet to the mile. This engine had six wheels, the hind drivers

of which had grooved tires to engage the rail. They have also built some very fine specimens for mines.

J. M. RILE, Brick Manufacturer, Bridge and Aldine streets, Frankford, Philadelphia. This business was founded about the year 1845, and continued under various managements until 1860, when the present proprietor came into possession. He built three kilns and separate shed room to carry on ten gangs, each gang composed of two men and a boy. The clay is manipulated by machinery; and the annual production is about two millions of "red bricks," which are disposed of in Frankford, Bridesburg and that neighborhood, besides being shipped heavily to New York. The specialty of the business is the excellence of the front or facing bricks for the exterior of dwellings. The premises are ten acres in extent.

JONATHAN M. RILE was born, 1818, in Grub Town, near Philadelphia. When three years old, he was taken to Montgomery county, where he lived until he was eleven years old, going to a private school there. He afterwards went to Philadelphia and learned the brickmaker's trade until he was twenty, and then became a journeyman for six years. He was afterwards foreman in a brickyard in Kensington for many years. Subsequently, he went to Pea Shore, New Jersey, where he acted as Superintendent of the Steam Brick Works there, having from 80 to 100 hands employed and turning out from 50,000 to 60,000 bricks per day. In 1854, he went into business in Frankford, as one of the firm of H. & J. M. Rile, eventually becoming sole proprietor, as above stated. After renting the premises for several years, he purchased the ground in 1869, having previously acquired the plant and machinery. In 1865, he was elected Director of the Poor, and has since been continued in that position. He is doing a profitable business, and is an energetic, enterprising man.

CARTER & SCATTERGOOD, Manufacturing Chemists, northwest corner of Twenty fourth and South streets, Philadelphia. The establishment was founded by John and Daniel Elliott, in 1819, and was then located at the corner of Pine and Schuylkill Fifth (now Nineteenth) streets, Philadelphia. In 1834, the business was purchased by ——— Carter and ——— Scattergood, who assumed the firm-name of Carter & Scattergood, and still continue the works. These were subsequently removed to the present location, which occupies the entire block, bounded by South, Twenty-fourth, Bainbridge and Twenty-fifth streets. The articles manufactured are chiefly those denominated dyers' chemicals, consisting of the red and yellow Prussiate of potash, so largely used by them and for making Prussian blue. The products, as long ago as 1858, were 400,000 pounds yearly, worth at that time $120,000. These articles are principally sold to manufacturers of cotton and woollen materials in the New England States.

THOMAS S. FOULKROD, Builder, was born, March 4th, 1820, in the village of Frankford (now the Twenty-third Ward of the city), Philadelphia, and is of German descent. He was educated in the common schools of the period, though he is partly self-taught. When ten years of age, he commenced working on a farm, and attended school during the winter. In 1834, he went to Philadelphia, where he found employment in a store, and remained there until he was seventeen years of age, when he was apprenticed to learn the carpenter's trade. In three years time he had perfected himself in this calling, and then became a journeyman, working in the shop of Jacob Lesher, of Frankford, with whom he continued for eleven years. At the expiration of that time, his employer retired from business, and he succeeded to the same, in connection with Thomas Taylor, who conducted it under the style of Foulkrod & Taylor, on the premises located on Hedge street, between Orthodox and Meadow streets, as carpenters and builders. This partnership lasted until 1862, when it was dissolved. During its continuance, among the many buildings erected by them were the Baptist church, Frankford, Wingahocken and Willow Brook Mills, the Bridesburg Armory, and the depot of the Frankford & Southwark Passenger Railway Company. A short time previous to the dissolution, the senior member had been commissioned Deputy Collector of Internal Revenue for the Fifth Congressional District, so continuing until October, 1870, when the office was abolished, the assessor becoming the collector. He had, however, resumed the building business on his own account, in 1864, and has so continued ever since. During the past ten years he has erected many

handsome dwellings, which beautify the city. He is self-reliant, industrious and enterprising.

JOHN MORGAN, Builder, etc., was born in Radnor township, Pennsylvania, in the year 1786. He settled in Phœnixville when but a boy, and lived to see it grow from a mere village to one of the most prosperous business centres in the State. By trade he was a carpenter, and by care, energy and thrift succeeded in amassing a handsome fortune. He built the first brick house in Phœnixville, and was one of the originators and promoters of the Reading Railroad. In 1828, he and the late Isaac Trimble, of West Bradford, were elected on the Democratic ticket to the State Legislature, and, in 1839, he was again elected on the same ticket with Joshua Hartshorne, Joel Swayne and Joseph Baily. He was President of the Phœnixville Bridge Company till the time of his death, having been a member of that association for a long time. He died in 1872, universally regretted by his fellow-citizens and all those who knew him. In his business character he was upright and exact in all his transactions, quick and determined in his judgment, which usually proved correct, and in private life affable and courteous to all, extending his hand to the rich or the poor with equal cordiality.

JAMES McCRASKY DORLAN, Manufacturer of Wall Paper, was born in West Brandywine township, Chester county, Pennsylvania, March 19th, 1807, of Scotch-Irish ancestry. When thirteen years of age, he was apprenticed to the paper-making trade with Davis & Cooper, of Chester county, with whom he remained seven years. In 1828, he rented the Laurel Paper Mills, in Chester county, for a term of years, and embarked in business on his own account. A few years later, he purchased the Mount Dale Mills, where he had served his time as an apprentice, which he soon enlarged considerably, and which are now known as Dorlan's Mills. About the year 1840, he began to make experiments, in order to discover a process of sizing wall paper. After various unsuccessful experiments, he finally invented a process for rendering this material water-proof and poreless, and which may be considered one of the most important and valuable discoveries in the history of that trade. After having brought the process to the desired perfection, he patented it in the United States, Great Britain, France, Canada, Belgium and Prussia. This improvement was appreciated by the public, and resulted in securing the mills very large orders from all parts of the country. In 1866, he resigned his business into the hands of his sons, who continue to carry it on, and retired to a large farm, where he now resides. In 1850, he was chosen by the voters of the county a member of the House of Representatives at Harrisburg, where he served satisfactorily to his constituents. He married, in 1827, Elizabeth Dowlin, of Chester county, Pennsylvania.

THOMAS S. DIXON & SONS, Manufacturers of Low-down Grates, Patent Gas Logs, Furnaces, Heaters, Ranges, etc., Philadelphia. This house was established, in 1853, by James Andrews and Thomas S. Dixon, under the style of Andrews & Dixon. The senior partner, James Andrews, had been foreman in the well-known manufacturing house of Morris, Tasker & Morris, who, up to the year 1853, had carried on the manufacture of grates, furnaces and ranges, and in that year sold to Andrews & Dixon all their stock and fixtures in that particular department. In 1864, James Andrews retired, and Thomas S. Dixon continued it alone until 1865, when he associated his two sons, Thomas N. and George B. Dixon, in partnership, and the firm style became Thomas S. Dixon & Sons. The factory is located on Twenty-second street above Chestnut street, and is four stories in height, and extends 31 by 62 feet; the number of hands employed being thirty. The motive power is supplied by an engine of fourteen horse power. The house has, through all its career, manufactured furnaces, ranges and heaters, but their special attention has throughout been devoted to the production of low-down grates, to which they have added the further specialty of gas logs, which were patented and introduced in 1871. The advantages of low-down grates, as a means of ventilation, are admitted by scientific men. They have an additional advantage, in that they give out a larger proportion of the heat of combustion than others, and do not exhaust the room of its oxygen. And, further, the fire, being built on a level with the floor, both warms that part of the room which is always the coolest, and places the ventilating medium in the position where it can be of the greatest use, modern investigation having proved that the foulest air always falls to the floor of a room. Dr. W. W. Hall, in the New York *Journal*

of Health, commends this kind of grate as being the healthiest and most delightful artificial heat produced. The second specialty of this firm is the patent gas log. This is made of clay, and formed and colored so as to exactly resemble an ordinary log of hickory wood. Three or four of these are placed one over the other, as real logs would be arranged for a fire; splits of asbestos are fixed on them irregularly, which become incandescent when in use, so that when the gas is turned on, and the numerous small gas gets are ignited and combined, the logs give a very close imitation of a hickory wood fire. They are beautiful, cleanly and durable, and also very efficient. The cost is but from eight to fifteen cents per hour when burning at full head. The log becomes heated very quickly after the starting of the fire, and the flow of gas may then be considerably reduced, without diminishing the heat. It constitutes one of the most cheerful fires in existence, owing to the complete illusion of the ingenious invention. The annual production of low-down grates turned out by the firm is about 800. The prices vary from $25 to $400. A very large number of these grates have been set up by this firm in Philadelphia alone, and still more throughout the country, especially in public buildings, insurance offices, banks, hotels, etc. In Philadelphia, the offices of the Pennsylvania Railroad, and those of the Reading Railroad, the Custom House, and several banks, are supplied with them. In Washington, D. C., they are to be found in most of the Government offices. The firm also manufacture and import all the necessary accompaniments of fancy fenders, fire-screens, andirons, fire sets, etc. The quantity of iron annually consumed by this house is 120 tons. Their store is at 1330 Chestnut street.

ALLENTOWN ROLLING MILL COMPANY, George B. Newton, President; C. W. Leavitt, Secretary; Robert Young, Treasurer. Office, 303 Walnut street, Philadelphia. This company derives its name from the original rolling mill near Allentown, which was built in 1860, for the manufacture of T rails, to which it was exclusively devoted until 1871. The works are admirably situated for the business, having the Lehigh Valley Railroad, with double tracks, on one side, and the Lehigh Navigation on the other, affording very superior transportation facilities, which is a matter of great importance in the manufacture of iron and its products. The first mill was started by Benjamin Haywood, associated with some other parties. In 1871, the properties known as the "Roberts Iron Works," and belonging to the iron company of that name, were merged in the Allentown Rolling Mill Company. These additional works consisted of two blast furnaces, each with a stack 70 feet high, and 16 feet diameter of bosh, with all the engines, boilers, blowing tubs, and necessary machinery for operating the same. The valuable hematite and magnetic ore beds of the same corporation were leased, so that the present organization enjoy unequalled facilities, mining their own ores, smelting these in the two great furnaces, whose average annual capacity is 20,000 tons of pig-metal, and this product being used in their other works, to be turned out in the various marketable articles which are manufactured by the company. About the same time, also, the "Lehigh Rolling Mills" were purchased, and enlarged to three-fold their original capacity. This mill is devoted to the manufacture of bar-iron, fish-joints, and light steam and street rails, while the original mill is used for heavy rails. With these facilities, the company manufacture every description of rails, from the lightest made, weighing but twelve pounds to the yard, up to the heaviest, weighing seventy pounds per yard, and produce annually about 40,000 tons of finished railway iron. In 1872, the corporation built large works for the manufacture of bolts, nuts, rivets, etc., and also purchased Thayer, Erdman & Wilson's foundry and machine shops, thus making their establishment one of the most complete to be found in the State or country. The range of iron work done embraces nearly every description of both wrought and cast-iron work. The foundry and machine shops enable them to turn out all kinds of light and heavy castings promptly to order, and to make any kind of machines economically and well. As an evidence of this, it may be stated that in the summer of 1874, the company completed their contract for the iron work on the great iron bridge spanning the Raritan river at South Amboy. In addition to the products already named, there are manufactured in the different departments of the business, railroad cars, turn-tables, steam engines, and iron machinery of all descriptions. The success which has ever attended this corporation is due to the fact that they have always adhered to the principle of making the best iron that could be produced; and the wisdom of this course is shown in the permanent character of their trade, which has withstood all business depressions. In this connection it may be remarked that the immense establishment was kept in operation—employing 1200 hands—during the great financial

depression which commenced in September, 1873, and which crippled and closed so many iron establishments of the country. This fact also testifies to the superior character of the iron produced, which was in demand when all other kinds were a drug and could find no sale.

JOHN GIBSON'S SON & CO., Distillers, Rectifiers, and Wholesale Liquor Dealers, Gibsonton Mills, and 232 and 234 South Front street, Philadelphia. The late John Gibson commenced the liquor business about the year 1840, and, in 1856, erected the Gibsonton Mills Distillery on the Monongahela river. This distillery is considered the finest establishment of the kind in the country, and its products have long enjoyed a very wide celebrity. The reputation which it gained is largely due to the sagacious management of its founder, who devoted himself to his business with the most untiring energy. The establishment thus inaugurated but a little over the third of a century has now grown into vast proportions, and, in the extent of its buildings, the perfection of its details, and productive capacity, is one of the most valuable in the Union. After the death of the founder, which occurred in 1865, his son, Henry C. Gibson, assumed control of the business, associating with him Andrew M. Moore and Joseph F. Sinnott, under the firm-name of John Gibson's Son & Co. The members of this co-partnership were each, for many years, connected with the original house, and may be said to have been literally brought up with the trade. To their intimate acquaintance with the theory and practical details of the business, joined with untiring industry, steady application, and unswerving integrity, they are mainly indebted for the proud position the firm now holds in the manufacturing community. They have at the present time actually invested in the trade a heavy capital, estimated at $3,500,000. Their capacity of production is 150 barrels per diem of fine whiskey, which —valued at $80 per barrel—represents a daily product of $12,000. This whiskey is manufactured only from the best quality of rye grown in Pennsylvania and West Virginia. The stock usually carried by the firm is about 25,000 barrels of different ages, valued in round figures at $3,000,000. The amount of taxes paid by the house into the United States Treasury amounts to over $2000 every day, being $750,000 yearly. They give employment to 200 hands. In addition to their Philadelphia house, they have agencies at No. 62 Broad street, New York; No. 125 Broad street, Boston; and Nos. 87 and 89 Poydras street, New Orleans. The great establishment at 232 and 234 South Front street, Philadelphia, is sufficiently important to deserve more than a passing notice. The main business of this house is the grading of fine whiskeys, in which department the firm transacts a very large trade. Whiskeys of different ages are brought from the distillery when fit for use, and blended together after the method usually employed in the grading or blending of French brandies. On the second and third floors are 400 staved casks, capable of containing about 320 gallons each, in which the whiskeys are retained until perfectly bright and fit for shipping. At this establishment the firm daily manufacture 150 barrels of French spirit, rectified whiskey, gin, and domestic brandy. For those who are not familiar with the complicated process through which the article known as whiskey passes before it reaches the consumer, a visit to the Front street establishment cannot fail to prove interesting. The Gibsonton Mills are under the supervision of the firm in Philadelphia, and it is not too much to say, that the routine of the business in all its details is attended to with a precision not surpassed in any military camp in the world. The other buildings are two large bonded warehouses—one being 110 by 50 feet, and the other 93 by 50 feet—having an aggregate capacity of 9000 barrels. These two rooms are detached from those already described, and are provided with doors and shutters made of strong boiler iron. The walls are of solid stone, 2½ to 3 feet thick, and four stories high, with basements: the roofs are of slate with brick cornices. All the warehouses are constructed with a view to support the enormous weight which each floor is destined to carry. Another large warehouse has been completed of solid brick masonry, for the storage of whiskey in packages after the duty has been paid. This free warehouse is 106 by 50 feet, four stories in height, and has a capacity of 6000 barrels. The system of heating the rooms is by steam, and is perfect in principle and detail. The heat is generated by two steam boilers, detached from the warehouses, and erected in massive masonry. The pipes which convey the steam are of wrought-iron one and a quarter inches in diameter, and rest on iron supporters for greater security. No artificial lights are used in these buildings under any pretext. The heat is kept at a uniform temperature of 80 degrees, both in winter and summer, and by this means the whiskey is brought to the requisite maturity to suit it for the market. In addition to these structures, there are cooper shops, where the firm manufacture all the

barrels used in the establishment; and three large sheds, one of which—110 by 50 feet—is for the storage of the same. Each is detached from the other to insure safety from fire.

JOHN GIBSON was born in the vicinity of Belfast, Ireland, and received a liberal education in the schools of that city. When about twenty-two years of age he emigrated to the United States, believing he could advance his position far better than by remaining in his native country. He landed in America without friends or influence of any kind, but was entirely dependent upon his own efforts. His pleasing address, however, together with his fine business qualifications, speedily secured him a large circle of acquaintances and profitable employment. Being appointed Note Clerk in the Mechanics' Bank of Philadelphia, he performed the duties of the position in an eminently satisfactory manner for a number of years, until he went into business for himself in the wine and liquor trade. Shortly after becoming attached to the Mechanics' Bank, he published a "Treatise on Book-keeping," which was received with marked favor by the mercantile portion of the community. His uncompromising integrity, the suavity of his manners, his remarkable business talents, and his many other noteworthy personal qualities, caused him to be cordially esteemed and respected by the community in the midst of which he resided, and elicited the warmest expressions of regret at his death, which occurred March 11th, 1865.

DEHAVEN & SON, Stove Manufacturers, Allegheny City and Pittsburgh. This house was established, in 1857, by the present firm, which is composed of David DeHaven and his son Isaac. The manufactory is located on Arch street, Allegheny City, where the senior partner personally attends; while the salesroom and offices are at No. 22 Wood street, Pittsburgh, and are under the supervision of the junior member. Among the many different varieties manufactured by the firm may be named the "Sterling," their own patent, with either drop or sliding feed doors; the "Wenona," a large, heavy, and durable stove, with patent bailed ash-pan, dumping and shaking grate; also the "Concord," a cheap, but substantial and well-constructed stove, containing several new features. The "Duquesne" is the most complete and satisfactory exclusive coal cook stove made, the oven and flues being larger than any other of its class. The firm also make a large assortment of parlor stoves for coal, wood, or both. The salesrooms and warehouse in Pittsburgh are completely filled with a fine selection of all the firm's manufacture; the stock usually carried amounts to $30,000; while the sales reach yearly the sum of $100,000, and from 8000 to 10,000 stoves are made per annum. The business is in a very flourishing condition, and their success is due to the fact that they never allow an inferior or imperfect article to leave their establishment.

PHILIP BILLMEYER, Lumber Merchant and Canal Boat Builder, Lewisburg, was born in Liberty township, Montour (then Columbia) county, Pennsylvania, October 10th, 1814. He is the son of George and Anna Billmeyer, and lived on his father's farm until about twenty seven years of age. His father owned a saw-mill in connection with his farm, and the young man occupied a portion of his time in that establishment, where he took his first lessons in that business which he afterwards so extensively carried on. He exhibited in early life manifestations of that force of character and industry which distinguished his after career. He was appointed by Governor Porter, in 1837, Registrar and Recorder of Deeds for Columbia county, a position which he held until a subsequent change in the Constitution rendered that office elective. In 1840, he was married to Susan Follman, daughter of Daniel Follman, of Limestone township. During the ensuing ten years he was engaged in the lumber and saw-mill business, in the neighborhood of Milton, Pennsylvania. He remained there till 1853, when he moved to Lewisburg, and became a partner in the firm of Frick, Slifer & Co., in the same business; but he subsequently purchased the interest of his partners and organized the firm of Billmeyer, Dill & Co., a name which it still bears. The firm is one of the most extensive in the lumber business in central Pennsylvania, manufacturing 5,000,000 feet of lumber and building 100 canal boats annually, giving employment to upwards of 100 men. A considerable portion of the timber used in these works is cut on lands belonging to the firm, which operation also affords employment to many hands during the winter. The senior partner is one of the oldest lumber merchants on the West Branch of the Susquehanna. Besides his regular business, he is a large stockholder in one of the principal banks of the county, and has been for many years a director in that institution, contributing largely by his energy and judgment to its success.

Samuel Wimpenny

SAMUEL WINPENNY, Manufacturer of Hosiery, Blankets and Cloths, was born in Yorkshire, England, about 1777. His father, also named Samuel Winpenny, was a well-known manufacturer of broadcloth at Wike, England, while his grandfather was a prominent manufacturer of his day in Flanders. He was fairly educated in his native country, and was brought up to his father's business. Having in early manhood married Ellen, daughter of James Bolton, a member of the Royal Academy at Edinburgh and an artist of some distinction, he remained in England until 1805, when he went to North Carolina, and there set up the first cotton gin ever put into full operation. He removed to Germantown in 1808, and operated the mills now known as Kelly's Mills, and there made the first Germantown hosiery and produced the first blankets and cloths ever manufactured for the United States Government in this country. His family having joined him in October, 1810, he removed, about 1811, to the works now occupied by William Simpson & Sons, at the Falls of Schuylkill, where he was eminently successful with Government contracts, and continued till 1815, when he returned with his family to Germantown. There they remained until 1818, when they returned to the Falls of Schuylkill. After giving up his own business, he was engaged in setting up machinery and promoting the interests of manufacturers in various mills until 1829, when he was induced to start for Lancaster, Pennsylvania; but at Carlisle he was taken suddenly ill, and died at the age of about fifty-two years, leaving a widow and daughter with five sons, John, Samuel, William, Joseph and James B., all of whom were, or subsequently became, prominent and practical manufacturers.

JOHN WINPENNY, son of the former, was born in Yorkshire, England, October 24th, 1800. He came with the family from England and settled in Germantown, in October, 1810, following the fortunes of the family in their various removals, as recited above, and obtaining such education as was afforded by the schools of that time during a brief period of school life. He entered the mills of his father in early youth, and practically mastered all the details of manufacture. He married Esther Marshall, of Roxborough, in February, 1821, and continued to work at the manufacturing until a date probably earlier than 1828, when he started on his own account, by the assistance of Frederick Stoever, in a mill owned by the latter, now forming a part of the property occupied by John & James Dobson at the Falls of Schuylkill. He and his brother Samuel formed a co-partnership about 1834, and continued to operate, for the production of kerseys, blankets and blue cloths for the Government, in Stoever's mill for some years, and, though twice burned out, their energy triumphed over every misfortune. Having purchased the mustard mill of Charles V. Hagner, at Manayunk, in 1839, they made the necessary alterations and erected additional buildings; but as they approached completion they were destroyed by fire, and the labor of months vanished in an hour. Nothing daunted, they rebuilt the mills without delay; they removed their machinery thither, occupied them in autumn, 1839, and commenced full operations in the spring of 1840. The partnership was dissolved, July 1st, 1847, and the business continued by John Winpenny until his death, on September 7th, 1856. He was an intimate friend of Governor Bigler, a violent opponent of the banking system, for many years Chief Burgess of the borough of Manayunk and an active promoter of beneficent local enterprises.

SAMUEL WINPENNY, also a son of Samuel Winpenny and Ellen Bolton, was born in Yorkshire, England, February 13th, 1804. To his mother, who was a woman of unusual culture and carefully instructed her children, he was indebted for the greater part of his education. Having accompanied the family to the United States in the vessel of Captain Towers, in 1810, he entered the mills of his father, at the Falls of Schuylkill, when but eight years of age. His industry and intelligence caused him to take high rank among the practical and scientific men of his business, and he has long enjoyed the reputation of being one of the best blue dyers in the United States. As above mentioned, he was from 1834 to 1847 associated with his brother in the manufacture of kerseys, blankets and blue cloths. To this firm, which was most successful in the filling of Government contracts, he contributed his skill and energy, adding in no small degree to its prosperity. Having removed to Ohio, in 1848, he was engaged in various speculations until 1850, when he returned and lived in retirement until 1861. In that year he associated in partnership with his nephew, Bolton Winpenny, at the old mill in Manayunk, and was engaged in the execution of Government contracts until 1863, when he withdrew, and has since lived quietly with his family at the Falls of Schuylkill. Though past three-score and ten, he retains his

physical and intellectual powers to a remarkable degree. During his long and active career, embracing four European trips, he has acquired a large fund of general information, causing his society to be much sought. He married, in 1849, Elizabeth Shronk, of the Falls of Schuylkill, daughter of George Shronk and grand-daughter of Godfrey Shronk, one of the earliest settlers of the locality.

WILLIAM WINPENNY was born November 1st, 1811, and after learning the business, as his brothers, went to Millersville, Indiana, where he engaged in manufacturing on his own account, and became a prominent and influential citizen. He there continued until his death, in February, 1861.

JOSEPH WINPENNY was born at the Falls of Schuylkill, January 31st, 1815, and, having entered the mills in his boyhood, became an experienced operator and for many years was the efficient superintendent of a department in the mills of his brothers.

JAMES B. WINPENNY, manufacturer of yarns, was born in Germantown, April 7th, 1817. After a few years spent at school, he entered his brothers' mill, at the Falls of Schuylkill, where he remained some two or three years, after which he attended school until he was seventeen years of age. At that time he went to take charge of his mother's store, at the Falls, where he continued until he was about twenty-four years of age. He went to Virginia in 1841, and until 1844 was a contractor for railroads and bridges, and then, having returned to Manayunk, associated in partnership with George Moyer and engaged in the spinning of yarn and manufacture of cotton goods, in the mill now occupied by Littlewood & Lancaster. Having removed to Joseph McDowell's mill in 1847, he operated it for the production of yarn until 1852, when he leased the mills now occupied by him of the Darrach estate, and operated them as lessee until 1863, when he purchased the property. In 1865, he erected a new three story building, 50 by 45; and again, in 1871, he enlarged and raised the main building, originally 64 by 45 feet, three and a-half stories, by the addition of 36 by 45 feet, four stories, making the main edifice full four stories in height. During the war, he was engaged in making army blankets, but shortly after its close he resumed the making of yarns. He spent several years in the Borough Council and has been for nearly twenty years a school director. He is enterprising and active as a liberal supporter and promoter of public improvement.

BOLTON WINPENNY was born at the Falls of Schuylkill, August 15th, 1836. He is a son of John Winpenny and Esther Marshall. After receiving a good education at the school of Samuel Alsop, at Wilmington, Delaware, he entered the drug store of Samuel Grant, Jr., & Co., in 1852, and subsequently became the superintendent of their drug mill, where he continued until after his father's death. He was then occupied in the settlement of his father's estate until December, 1858, when he was induced to engage in manufacturing in the mills previously occupied by his father. As he was without practical experience in manufacturing, he had objected to taking the mills, but yielded to the advice of James Dearie, and engaged in business with a few looms and $100 capital. So great was his perseverance and energy that within a year he had the whole mill running, and within five years had it refitted with the most approved machinery. As set forth above, he was for a time in partnership with his uncle, Samuel Winpenny, but after that conducted the business as sole proprietor with marked success until February 23d, 1872, when he sold to Preston & Irwin. He became a special partner in the commission house of William Yelland & Co., of New York, January 1st, 1868, and was one of the originators and is still half owner of the Arch Street Opera House. He was married, June 11th, 1857, to Lucy A., daughter of Hon. Pierre A. Sutton, of Danbury, Connecticut.

THE NIMSON FORGE AND AXLE COMPANY'S WORKS, Allentown, Lehigh county. This industrial establishment was founded, in 1871, by Charles H. Nimson, an enterprising citizen of Allentown, who owns the greater portion of the stock. The works are located at that city and are devoted to the manufacture of heavy forgings, axles, etc., and have a capacity to produce from 100 to 125 wagon, coach and carriage axles, and from twenty to thirty locomotive and railway car axles per day. Shaftings up to 10 inches in diameter are cast, and other castings of a varied character are likewise made. At present there are but seventy hands employed, the works not being operated to their full extent.

CHARLES H. NIMSON is one of the most

popular iron masters in the Lehigh Valley. Beside owning the controlling interest in the works above-named, he is also a stockholder and the Superintendent of the works of the Allentown Rolling Mill Company. He also operates the Emaus Furnace, at Emaus, Lehigh county, although he does not own that property. In addition to these, he is the largest shareholder in the new furnace at Kutztown, Berks county, which has not yet (May, 1875) gone into operation.

PHILADELPHIA INQUIRER PAPER MILLS, William W. Harding, Proprietor, Manayunk. The original structure is a very old one. In 1829, Joseph McDowell, then proprietor, leased the upper portion to Joseph Ripka for the introduction of his first looms, while he himself occupied the lower part as a paper mill. This arrangement continued until 1834, when Ripka removed, and portions of the mill were subsequently occupied by different parties for manufacturing purposes. The present proprietor having purchased in 1865, gave the name of his newspaper to the mills which he designed should henceforth produce the paper upon which it was printed. The works occupy a site 80 by 360 feet. The buildings consist of the original four-story mill, 40 by 60 feet, in the rear of which is a three-story boiling and stock room, 20 by 60 feet, two machine rooms, respectively, 24 by 100 feet and 20 by 80 feet, attached in the form of the letter L, and a new three story building, 50 by 130 feet, erected, in 1866, for the manufacture of wood and straw pulp. All the buildings except the boiling and stock room are substantially built of stone. They use two large Foudrinier paper-making machines, respectively 62 and 72 inches wide, with all the most approved appliances for the preparation of stock, including three boilers for cooking, making alkalies, heating, and drying purposes, two large rotary boilers, two washing engines, four heating engines, etc. The motive power is derived from four of Leffel's turbine wheels driven by water from the canal, which are supplemented in cases of emergency by a 120-horse Corliss steam engine. The mills running day and night give employment to two sets of operatives, and require the services of about seventy-five hands. They consume about 2800 tons of coal, 1300 tons of rags, 1040 tons of straw, and 780 cords of wood per annum, producing an aggregate of about 1250 tons of book and news paper. The works are under the superintendence of J. R. McFetridge, for many years connected with the *Philadelphia Inquirer*, and under the present proprietor, who pays out about $40,000 per annum for the labor therein, the capacity of the mills has been largely increased.

CARROW, CROTHERS & CO., Manufacturers of Fine Jewelry, 308 Chestnut street, Philadelphia. This house, with its predecessors, has had a continued existence of over sixty years. It was founded, about 1812, by the firm of Rickards & Dubosq, who were succeeded by Dubosq & Jardella. The latter firm did not continue long, owing to the death of the junior member, but became Henry, Dubosq & Baton. After the retirement of the latter gentleman, John Carrow and Frank Thibault, afterwards with Frank Dubosq, succeeded, and the firm name was once more changed, becoming Dubosq & Carrow, then Carrow & Co., and, after the withdrawal of the senior partner, Carrow, Thibault & Co. The present firm was founded about six years since, after the death of F. Thibault. J. S. Carrow, son of the senior member, was then admitted. The senior member commenced the business as an apprentice with Rickards & Dubosq in 1827, and made his way up the ladder, until he is now the head of this large and flourishing establishment, and has a thorough personal knowledge of each department of the business. The firm manufacture only the better class of goods, and with one exception (their "line" bracelet), all of their jewelry is made from pure gold. Their factory is in the fourth story of the building, No. 308 Chestnut street, and is 50 feet wide and 100 feet long. Here, on an average all the year round, they give employment to 100 hands, nearly all of whom are the most skilful workmen. It is in this busy hive, that the fine bracelets, lockets, charms, earrings, pins, buttons, studs, trinkets, etc., are made, that are sold in first-class jewelry stores, Bailey's and Caldwell's of Philadelphia, Tiffany's of New York, and other leading establishments throughout the United States. The firm manufacture sixty different patterns of ornaments for lockets, and about seventy varied patterns for bracelets, of the most elegant design and workmanship. They also keep on hand a stock of diamonds, corals, cameos, pearls, etc., and make everything included in the fine jewelry line, except chains, the manufacture of which is a separate and distinct branch of the business. Fifteen hundred pennyweights

of pure gold are used by this establishment every week. The firm have a house in New York city, at No. 12 John street, which is under the personal management of Thomas J. Crothers, and samples of all goods made at the factory are sent as soon as finished to the New York office, so that merchants purchasing in that city have the same facilities as though buying direct from the factory. They also employ the services of two travelling agents, in different parts of the country, each of whom carries a stock of $25,000 to $30,000. Their present high reputation they owe not only to their being attentive and courteous gentlemen, but more particularly to the fact that they manufacture nothing but the best quality of goods, and examine everything most carefully before sending it out.

WILLIAM WILER, Manufacturer of Stair Rods, Philadelphia. This house was established in 1851, at the present location, No. 225 South Fifth street, by William Wiler and Charles Thomas, under the style of Wiler & Thomas. This firm was continued for two years, when it was changed, by the admission into the partnership of Henry Billington, into Wiler, Thomas & Co., remaining thus until 1854. In this year a second change took place; Charles Thomas and Henry Billington retired, and Lucien Moss became a partner, the firm-name being changed to Wiler & Moss. This arrangement was a permanent one. It continued for nineteen years; being dissolved by the withdrawal of the junior partner, in July, 1873. The productions of the house consist of stair rods, of which they make about forty separate and distinct styles, stair plates, fasteners, rod loops, vestibule rods and brackets, zinc plates, escutcheons, brass railing, trunk bands, German silver mouldings, gas keys, etc.; the stair rods are made of brass, bronze, and nickel, and are also silver-plated, or fire-gilt. Open ornamental work is sometimes introduced, showing a back-ground of blue, scarlet, etc. A patent gas torch and turner has lately been introduced by this firm, which has been very successful. The factory is a building 165 by 44 feet in extent, and five stories high; the number of hands employed is about eighteen. The goods annually turned out amount in value to about $50,000. Twenty tons of brass, and about thirty-five to forty tons of iron are consumed yearly, in addition to other material, of which nickel is the principal. Nickel stair rods are made of an alloy of nickel with copper.

WILLIAM WILER was born in Philadelphia, July 9th, 1822. His parents were John and Mary Wiler. He was educated in Philadelphia, at a school on Walnut street, and, at the age of seventeen, was apprenticed to Edward Jones, a manufacturer of stair rods, in Library street. He served his time here, and then worked as a journeyman and finally as foreman. On leaving this factory (in 1851) he commenced business on his own account.

ROSENA FURNACE, Reis, Brown & Berger, Proprietors, New Castle, Lawrence county. There are three furnaces in operation belonging to this firm, at New Castle; the height of the stacks being 40, 65, and 77 feet, while the boshes are 9, 14, and 20 feet in diameter, respectively. The ores reduced are the Lake Superior and native. The aggregate annual capacity of these works is placed at 40,000 tons of pig-metal. The same firm are also owners of the

SHENANGO IRON WORKS, which are located in the same town, and comprise the following industries, viz.: a bar mill, a plate mill, a sheet mill, and nail works. The machinery and appliances consist of twenty-seven boiling furnaces, eight heating furnaces, one 18-inch muck train, one 16-inch bar mill, an 8-inch guide mill. The nail works contain fifty-five nail machines, producing 450 kegs of nails per day. In the several mills are manufactured bar, rod, sheet-iron, nails, spikes, and bolts. The average annual product is 7000 tons of bar and sheet iron, 140,000 kegs of nails, and 6000 kegs of boat spikes. Between 700 and 800 hands are employed.

GEORGE C. REIS, senior member of the firm, was born, November 8th, 1823, in the city of Pittsburgh. His mother was a Pennsylvanian by birth, and his father a German; the latter was a butcher and pork-packer, in Pittsburgh. After receiving a fair education, he commenced business, in 1839, in a retail grocery store, on Fourth street road, now Fifth avenue, and remained there until 1846, when, in company with A. B. Berger, he started a wholesale business at the corner of Smithfield and Second streets, and at the same time engaged in pork-packing at Peoria, Illinois, which occupied his attention until 1853, when he removed to Niles, Ohio, where he became a member of the firm of James Ward & Co., in the iron business, and remained there until 1863. During all these years

he was still interested in the Pittsburgh store, the business there being carried on by his partner. He went to New Castle in 1863, and, in conjunction with William H. Brown and A. B. Berger, purchased the Orizeba Iron Works, gave them the name of the "Shenango," rebuilt and enlarged them to their present capacity. He is widely known as a thorough-going and public-spirited business man, and has been connected with many enterprises of note. He is Vice-President of the New Castle & Franklin Railroad Company; President of the Keystone Iron Mining Company, at Marquette, Michigan; Vice-President of the Shenango Iron Company; and a Director of the United Savings Bank, of Pittsburgh. He is a warm advocate of the Temperance cause; in religious belief, a zealous member of the Methodist Church; and in political faith a Republican. He was married, in 1846, to Elizabeth B., daughter of the late Edward Dithridge, of Pittsburgh, and has a family of eleven children, four daughters and seven sons. Most of the latter are engaged in the iron business.

A. B. BERGER, junior member, was born, September 23d, 1815, near St. Peter, in the Grand Duchy of Baden, and was reared on his father's farm in the Black Forest. At the age of fifteen, he was apprenticed to the clock and watch making business. Early in the spring of 1836, when twenty, he left home, and after travelling through France by the diligence, crossed the channel into England. On his arrival in London, he followed his trade for about fourteen months; and in June, 1837, was engaged by a gentleman in the north of England to become his travelling agent, collecting, etc. In 1838, he again went to London, travelling thence from Manchester by coach—there being no railways at that date—and arrived at his destination in time to witness the coronation of Queen Victoria. In the same year, he became a partner with his employer, and, shortly afterwards, located at Ramsgate, County of Kent, seventy miles below London. With his partner, he opened three stores, one in Ramsgate, one at Dover, and another at Folkstone, carrying on the same very successfully. In December, 1840, he disposed of all his interests in England; and in the same month embarked in an English vessel for Barbadoes. After a passage of six weeks, he landed at Bridgetown in that island, and having several letters of introduction to parties there, was enabled to open an extensive watch and jewelry store, and did a prosperous business until the autumn of 1841, when he was prostrated by an attack of yellow fever. As soon as he recovered he left the island, in October of that year, in an American vessel, and after a very stormy passage of four weeks, landed in Philadelphia, in November, 1841. He passed several months, both in that city and New York, engaging in the latter city with a ship broker to attend to the buying and furnishing vessels for sea. He soon tired of it, however, and in the autumn of 1842, repaired to Pittsburgh via Philadelphia, and within a week of his arrival, opened a jewelry store. He carried this on successfully until the fall of 1846, when he disposed of his entire stock and, in company with George C. Reis, started a wholesale and retail grocery and produce store, and was also his partner in the pork-packing business, at Peoria, Illinois. In 1852, he became a member of the firm of James Ward & Co., and built the Falcon Iron Works, at Niles, Ohio; he disposed of his interests in that firm in 1862, and having joined his partner in the purchase of the Shenango Works, took the general management of the concern in 1864. During a residence of twenty-two years in Pittsburgh, he served for seven years as a member of City Councils, and was instrumental in organizing various banks and other incorporated companies, acting as director in the same. For eleven years he has been a resident of New Castle, and was a member of the Borough Council for two years. He aided in organizing the borough into a city, and has served one year in the City Council. He is a Director in the Delaware Mutual Insurance Company, of Philadelphia; the President of the New Castle Manufacturing Company; and General Manager of the works, of which he is junior partner. It is to his able and efficient supervision that the enterprise in a great measure owes its success. He is one of the solid, reliable, business men of the State, and is respected by all. In 1851, he visited the World's Fair, and also his old home in the Black Forest. He was married, in 1843, to Rozena, daughter of the late George L. Reis, of Pittsburgh.

W. E. & N. H. CAMP'S Biscuit, Cake, and Cracker Bakery, Philadelphia, is located at 625 and 627 N. Broad street. The building is four stories high, and built in the most substantial manner, having a very handsome pressed-brick front on Broad street, and extending through to Pemberton street, with a front of 50 feet, and a depth of 130 feet. The nucleus of the business was formed by the senior partner, W. E. Camp, a little over twelve years ago, at the corner of Broad and Buttonwood

streets. In a few years he found his business too extensive for the place, and not being able to secure such room facilities as the increased trade demanded, opened a branch bakery in the city of Baltimore, under the present management. In 1872, the present site was purchased, and the elegant and commodious buildings, as they now stand, erected thereon, and the whole business brought under one roof. The most improved machinery and the best ovens have been adopted, most of the work being accomplished by steam power, the motive for which is supplied by an engine of twenty-five horse power, and a substantial boiler of thirty horse power, in addition to which about fifty hands find constant employment. The basement serves not only the purpose of an engine room, but is largely occupied as storage room for flour, lard, sugar and molasses, etc. The ground floor in front is set apart for offices, counting-room, retail sales-room, and shipping department, while further back are the ovens and machinery for preparing the doughs, cutting the crackers, baking, etc. On the second floor are the cake ovens for baking hand-made cakes, and the packing-room, where the crackers and cakes are packed up in barrels and boxes, ready for shipment. The third floor is occupied for the manufacture of candy, which is becoming a very important branch, and already constitutes no mean part of the business. The fourth floor is set apart for storage. The business transacted is very extensive, and has been greatly augmented by the superior facilities brought into use in the present location, and by which a larger variety of cakes and crackers are produced. These find a ready sale from the wagons which distribute the goods among the city dealers, and are also shipped to almost all points of the country. The business, under a wise and liberal management, is steadily increasing. The gentlemen connected with it are courteous and enterprising, and have, from the commencement, established such principles therewith as cannot fail to place it at once among the largest and most reliable of its kind in the country.

THE ARAMINGO MILLS were established in July, 1871, by the Aramingo Mill Company, and are situated at the corner of Unity and Leiper streets, Frankford, Philadelphia. For three-quarters of a century this locality has been devoted to industrial pursuits. About the year 1800, a tannery occupied the premises, operated by Harper & Gillingham, who failed in 1826. This enterprise was succeeded by a cotton mill, which was started on a small scale, in 1834, by Enoch Roberts, who, in the autumn of 1858, disposed of the same to John Clendening, Frank Schlater furnishing the purchase money for the same. These two gentlemen were for about a year associated together in operating the mill, but Schlater retired for a while; but eventually, in 1860, again became a partner in the establishment, and so continued up to 1869. In April, 1870, the firm of Campbell & Magee purchased the property, and, finally, the Aramingo Mill Company succeeded as owners and proprietors the following year. The buildings contain 180 looms, the business being essentially a weaving mill, and the goods manufactured comprise table damasks, bed-spreads, ginghams, linseys, etc. There are about 120 hands employed, and the amount of goods produced is about 150,000 yards monthly. The motive power is furnished by an engine of sixty horse. The buildings throughout are heated by steam, and are provided with a series of iron doors, to isolate certain portions in case of fire.

CLEMENT B. GRUBB, Iron Manufacturer, near Columbia, was born in Mount Hope, Lancaster county, February 11th, 1815. His ancestors were of Welsh extraction. His father, Henry B. Grubb, was a well-known and wealthy iron master of New Hope, who, unfortunately, died when his son was but seven years of age. The business was, however, carried on by the mother, a lady of remarkable character, the daughter of Daniel Buckley, a large farmer and prominent iron-worker of Lancaster county. Every educational advantage that wealth could bestow was freely lavished upon the boy. His preliminary studies were conducted in the schools of Long Island and Flushing, New York; the learning of his riper years he acquired in the high schools and private academies of Philadelphia. At the age of seventeen, in 1832, he entered the establishment conducted by his mother, in the capacity of book-keeper, and remained in that position until he had attained his majority. He then, in connection with his elder brother Edward, assumed control of the entire estate, and carried on the business under the firm-title of E. & C. B. Grubb. The advent of the new partnership was marked by the exhibition of youthful energy and enterprise. They immediately proceeded to rebuild the old furnaces, and to erect new works upon an extensive scale. The marked success which attended the efforts of the young firm is attributable

to the superiority of their product, their new appliances and intelligent management soon gaining them a high reputation as manufacturers of charcoal-iron. About the year 1851, the copartnership was dissolved by mutual consent, and two years later, in 1853, Clement B. Grubb built the St. Charles Anthracite Furnace at Columbia, Pennsylvania. He was also largely interested in the Port Deposit Furnace. He subsequently disposed of his interest in several furnaces to his brother, Bates Grubb, and also made sale of all the original works except "The Codorus," which he still owns in connection with a large tract (many thousand acres) of timber land. In 1872, he associated in partnership with himself his only son, Charles, under the firm-title of C. B. Grubb & Son, and they are now operating the St. Charles and Henry Clay Furnaces, near Columbia, and are doing an extensive business. The firm own several tracts of iron land, which produce a very valuable quality of ore. Mr. Grubb is an energetic promoter of internal improvements, and ever alive to the interests of his section and State. He built and was for many years President of the North Lebanon Plank Road, and is now the President of the First National Bank of Lancaster. He is a leading member of the St. James' Episcopal Church, and is a type of the cultivated, high-minded Christian merchant and gentleman. He was married February 27th, 1841, to a daughter of Charles Brook, an extensive iron manufacturer of Chester county.

LEHIGH VALLEY BRASS WORKS, B. E. Lehman, Proprietor, Bethlehem. These works were established, in 1862, by the present proprietor, who, from being the possessor of one small lathe, at the beginning, has advanced the business to its present extent. The main building measures 55 by 80 feet, and is two stories in height. A large portion of the first floor is devoted to the office and salesroom, to the left of which is the "finishing-room," where all brass, copper and iron castings are completed. This room contains twelve lathes, and all late improvements in labor-saving machinery requisite to the business. The second floor of the main building is divided into departments for the cutting of iron pipe, making elbows, etc., and for the manufacture of copper work of all descriptions, also as a pattern shop. In the rear of the main building is a large brass foundry, containing three furnaces, and the necessary appliances for casting the brass work. To the rear of this is another building, where all the iron fittings are cast, only for this establishment. There are twenty-five hands employed in the works, all of whom are skilled workmen. The foreman, R. Ross, is a mechanic of very great ability, and many of the leading articles manufactured at the establishment originated with and were patented by him. He is well known as a man of life-long experience, with a thorough practical knowledge of every branch and detail of this business. The capacity of the works is two tons of brass and copper per month, and the productions are valued at $75,000 yearly. The financial panic of 1873-'74 has not affected the business in the slightest degree, as orders have been constantly received during its continuance, and the works have not been stopped a day from this cause. Among the articles manufactured are globe valves, steam cocks, steam whistles, oil cups, gauge cocks, etc., also plumbers', rolling mill, furnace, and mining supplies, and a very superior quality of Babbitt's anti-friction metal, including a full line of special improved appliances for steam engines, boilers, hydrants, etc. Among these are Ross' patent stop-valve, which has been in use for nearly four years, under pressures from 10 to 300 pounds per square inch, and have given the most entire satisfaction in every instance. Ross' patent gauge cock for locomotives, marine and stationary boilers, is an improvement of very great merit, and, among other advantages, it admits of being repaired with a full pressure of steam on the boiler. They are used by many of the leading railroads, and wherever introduced have given general satisfaction. Lehman's improved ball lever gauge cock is one of the cheapest and most durable articles of the kind ever invented. It is constructed with an iron ball and gum socket, which can always be regulated to remain perfectly tight as long as a particle of gum remains in the socket; when once screwed into a boiler, it does not require to be taken out for repairs, as the socket can be unhooked at any time, and a new piece of gum inserted. It is especially adapted for use in furnaces and rolling mills. The vertical section of the "Excelsior Lubricator" is one of the most popular inventions ever introduced, as testimonials from leading machinists, etc., testify. The steam whistle chimes, manufactured at these works, are an acceptable substitute for the old harsh steam whistle. They are so adjusted as to produce a perfect musical chord of three tones, which, being blended together, destroy the ordinary harshness, and increase the power of the sound so that they can be heard at a great distance. An improved hydrant, patented December 5th, 1874, is now being introduced. It is constructed of cast-iron, and so arranged that, if necessary, it

can be repaired in the coldest weather without digging or taking out the post. The success attendant upon this establishment is not only due to the superior character of the workmanship—for no article of inferior merit is allowed to leave it—but to the industry, promptness, and energy displayed by the proprietor. He is a thorough, practical mechanic, having been engaged in the business from boyhood; and has won his present position as a leading manufacturer by fairness alike to customer and employé.

BERNHARD E. LEHMAN was born, 1835, in Bethlehem, and is descended from an old Moravian family, his grandfather having been a missionary from the parent church in Germany to the West India islands. He learned his present business with his father, Ernest Lehman, who carried it on in a small way. He is Superintendent of the Bethlehem—south—Water Works, which he constructed in 1867; also a member of the Water Commission of Bethlehem; a Director in the Lehigh Car Manufacturing Company, at Stemton, Northampton county. He is a member of the Moravian Church, and a prominent Mason.

CHAPMAN SLATE COMPANY, William Chapman, President and Treasurer; Charles H. Dickerson, Secretary; Richard Chapman, Superintendent. Offices at Bethlehem, and 503, 505, and 507 West street, New York city. This company was organized in 1864, with a capital of $300,000 (which was subsequently increased to $400,000), for the purpose of developing and operating the valuable slate quarry situated near the borough of Chapman, Northampton county, about ten miles north of Bethlehem. Many years previous to the above date, the founder of the enterprise, William Chapman, had emigrated to the United States, and on reaching this section undertook a contract in slate working which promised to be remunerative. He purchased property, and for quite a series of years worked the quarry in a small way. About the year 1858, he prevailed upon Augustus Wolle, of Bethlehem, to turn his attention to it; but it was not until 1864, that the latter became prominently identified with it. These two gentlemen, with Charles Brodhead, also of Bethlehem, were the principal stockholders and leading spirits of the enterprise, and so continue to the present day. The mining property of the company amounts to about 200 acres, the open portion embracing an area of 400 by 800 feet, with a depth of 200 feet. The daily production of these quarries reaches about 200 squares, each covering 100 feet. The supply seems inexhaustible. The rock is blasted, and produces blocks varying in length from 2 to 30 feet. These are generally split full length, though when very long are cut with hammer and tool. Five steam engines are employed, respectively of fifteen, thirty, forty, sixty, and one hundred horse power. The second of these is employed partly for hoisting, and partly for pumping water from the quarry; the sixty horse power engine is also used for hoisting partly, and for running the factory, where the planing, sawing, etc., of flags, mantels, lintels, billiard-table beds, tiling, cisterns, bath-tubs, pillars, fence posts, guttering, etc., are carried on. Tanks of 1000 gallons capacity have been also constructed in this department. The 100 horse power engine is also used for hoisting. Five wire cables pass from stationary derricks across the quarry, and on these cables—as on rails—four-wheeled cars travel. Two wheels of the cars run on the cables, while the others are used—with a block attached—for the hoisting cable to run upon, so as to raise the car or block from the quarry to the cable, when it is drawn up out of the quarry. There are holders called "telescopes" swung on pivots attached to the derrick, to hold the car while the load is being landed on the four-wheeled truck to be transported to the neighboring shop for dressing, or to be converted into roofing slate. Each of the cables is served by seven men, who supply the material for the cars. Sixteen loads per hour have been hoisted over each cable, and there are thirteen of these cable hoists in operation. Two of them were imported from Liverpool; the others were made in this country. The cables are from 820 to 900 feet in length. The hoists are the joint invention of William and Richard Chapman, the President and Superintendent of the company. The cables are tightened by means of mining capstans. In the dressing department there are thirty-two machines for dressing roofing slate, and each is attended by three men—two splitters and one dresser. These machines are a Welsh invention, and were first introduced into the United States by this company. When attended by skilled hands, sixteen or seventeen squares can be dressed per day, while but four or five can be produced by the old manual process. Over 200 men are employed in the quarries alone, all of them practical quarrymen, brought over by this company from the Cornish and Welsh quarries of Great Britain. One of the peculiarities of the Chapman slate is its superior quality. It is a rich, deep blue

in color, hard, close-grained, and very durable; and some qualities are very little affected by wear and exposure. For roofing, flagging, door steps, winding staircase steps, and floors for public buildings, it is unequalled. The roofs of the new Masonic Temple, Philadelphia, and the freight depot of the Pennsylvania Railroad, at the foot of Walnut street in the same city, as also of the immense buildings of the Bethlehem Iron Works, are covered with it. Numerous buildings of the Reading Railroad Company, and also many prominent public and private buildings in New York city have been supplied with it. The manufacturing facilities of this company are unequalled. The machinery is of the most improved construction, and the hands are all practical slaters. The company has been successful from the commencement of the enterprise, and have not been affected by the financial panic of 1873–'74; in fact, their business has increased, instead of diminishing. The officers of the company have a thorough practical knowledge of the business, in all its many details, and to each of them the highest honor and praise should be accorded for the able manner in which the immense enterprise is conducted.

WILLIAM CHAPMAN, President and Treasurer, was born, June 26th, 1816, at Mount Bornenshaun, France. His father was a slate quarryman of Cornwall, England, who, at the time of the war between Great Britain and the first Napoleon, had become First Lieutenant of an English company, and was wounded; when his wife, fearing for her husband's life, hastened to join him in France, and while nursing him there her son was born. On his recovery, he returned home with his wife and child, and the latter passed his boyhood in Cornwall, and for many years was busily occupied in the slate business. His education was obtained entirely at the night schools, where, after his daily labors were ended, he studied with industry and zest. In 1842, he came to the United States and settled in Northampton county, Pennsylvania, investing his capital in wood lands and slate quarries. He is the founder of the borough of Chapman, the home of the sturdy miners and laborers of the company. In addition to his executive duties connected with this enterprise, he is President of the Union Savings Bank of East Pennsylvania, a position which he accepted after much pressing and entreaty. He is the workingmen's friend, for by his efforts he has done much to ameliorate their condition, both by the liberal wages paid them, and his many gifts to needy but deserving laborers. Hundreds of honest and industrious workingmen from the overstocked mines of Wales and England have found with him constant employment and generous wages. He is a strong temperance man, and by his example and advice has furthered that cause greatly among all under his charge. He is a zealous member of the Moravian Church; and, in politics, is a Democrat. He was married, in 1857, to Emily F. Cary, of Bethlehem, and has a family of eight children.

AUGUSTUS WOLLE was born, September 8th, 1821, at Bethlehem, and comes of an old Moravian family, who have been identified with the history of that society at Bethlehem for many years. After receiving a thorough education in the church schools, he entered, in 1835, the co-operative store superintended by his father, and continued there as clerk ten years. In 1845, he purchased the establishment from the society, and remained its sole proprietor until 1853. He then associated in partnership with Robert P. Krause (now deceased) and James H. Wolle; subsequently admitting Ambrose J. Erwin. The business was conducted under the name of A. Wolle & Co., until 1863, when it adopted the style of Wolle, Krause & Erwin. Under this title the trade of the house was continued up to 1870, when the senior partner retired. During the thirty-five years of his active management the business increased with great rapidity, and its ancient rank (having been founded contemporaneously with the settlement of the town in 1742) as one of the principal trading houses in that region was fully sustained. He also was interested in other enterprises outside of his immediate business. He furnished the necessary capital to enable Francis Wolle, his brother, to properly place before the public his invention of making paper bags by machinery. He next interested himself in the manufacture of iron. Having been a stockholder in the Thomas Iron Company, of Hockendauqua, he conceived certain original ideas on the subject, and, in 1857, proceeded to carry them out. After three anxious years, during which time he had secured the land, he established, in 1860, the Bethlehem Iron Company, whose works are now the largest on the continent of America, and, at no distant day, may be pointed out as the largest and most complete in the world. After he had assisted in organizing the Chapman Slate Company, he founded the Penn Slate Company, which was not very successful at first; but as his personal responsibility was pledged, he reorganized it, and it is now in full and successful operation. He is a most persevering man, and far-sighted. He was married, in 1845, to C. E. Leinbach, of Salem, North

Carolina, and has a family of ten children living, of whom two sons—Clarence A. and Francis L.—are in their father's office.

CHARLES BRODHEAD was born, August 4th, 1824, at Conyngham, Luzerne county, Pennsylvania, and is descended from Daniel Brodhead, of Yorkshire, England, a Captain of Grenadiers in the expedition, during the reign of Charles the Second, that captured the New Netherlands from the Dutch, in 1664. His grandson, Daniel, born near Esopus (now Kingston, New York) in 1693, removed to Pennsylvania in 1736, and settled on lands near Stroudsburgh, and died at Bethlehem, in 1755. One of his sons was a famous officer in the Indian wars preceding the Revolution; and in the latter struggle was Colonel of the Eighth Pennsylvania Regiment, and subsequently Colonel of the First Pennsylvania, under the re-arrangement of 1781, and was assigned by General Washington to the command of the Western Department, which he held till the close of the war. He was the first Surveyor-General of the State, which office he held for many years. The father of Charles Brodhead was a prominent business man in Luzerne county for many years, and a member of the State Legislature, 1831–'34, but now resides with his son at Bethlehem. The latter graduated at Lafayette College, Easton, 1844, and at once entered the office of his uncle, Hon. Richard Brodhead, then representing the Tenth District in Congress. He completed his studies in the law school of David Hoffman, Philadelphia, and was admitted to practice at the bar of Northampton county, in 1846, at Easton, and was appointed Solicitor for the Sheriff, and practised for about three years. In 1850, his uncle was elected to the United States Senate, and thereupon the office was discontinued. He removed to Bethlehem, and purchasing land on the south bank of the Lehigh, extended the plan of Augusta—a town already projected—and named his property Wetherill, in honor of Colonel Samuel Wetherill, the founder of the Lehigh Zinc Works. He has donated seven acres of his land to the Lehigh University, of which he is a trustee. All of this land is now covered with manufactories and dwellings, and is incorporated as the borough of Bethlehem, south. In 1862, he projected the Lehigh & Lackawanna Railroad Company, from Bethlehem to Stroudsburg, of which he has ever since been President. He was one of the original promoters of the Bethlehem Iron Company, and is an active agent in other industries which have added greatly to the population, wealth, and power of his section. He is a consistent Democrat, but was never a candidate for office until 1872, when he was elected to represent Northampton county in the Constitutional Convention of Pennsylvania. He is a man of eminently progressive ideas, and of great industry and enterprise. Probably no one has done more to develop the resources of the section where he resides than himself. He was married, in June, 1858, to Camilla, only daughter of General Conrad Shimer, a State Senator, and the largest landholder in his county.

ARTIFICIAL FLOWER MANUFACTORY, F. & P. Rodrigo, Proprietors, No. 520 Arch street, Philadelphia. The business of this firm was established about sixty years since by the parents of the present proprietors, so that it is, in all probability, the pioneer house of the trade in this city, and perhaps in the United States. Like all new enterprises, the progress was slow at first; all the help had to be instructed in the art, but unflagging industry and perseverance brought success, and the business now rests on a sure foundation. The present firm have ample means and one of the largest manufacturing establishments in the city, employing regularly about sixty hands, many of whom have been taught the art under the immediate supervision of the proprietors, so that the work can be depended upon in every particular. The present partnership was formed in 1867, and the duties of the business are systematically divided, so as to insure the best results. The senior partner attends to the finances and out-door work, purchases, etc., while the junior, who is an expert in the business of making flowers, has charge of the details of the manufacturing. The factory occupies three floors, each being 30 by 110 feet, admirably adapted for the business. The trade is very extensive, reaching to all portions of the country. All the material is purchased for cash, thus securing a good starting point in all competition. The forming of the flowers and leaves and the coloring are done by selected hands, mostly men. The flowers are cut with dies, and pass through many processes before reaching the women, who mount them on stems and arrange into various groups, fitting them for the market. All the finer grades of flowers of every kind are made by the house. The style, beauty and finish of the productions, and the close resemblance to nature, even in the minor details of vines, twigs, delicate tendrils, stamina and pistils are marvels of taste, close observation and artistic skill. The

specialty of the house is the best goods at the lowest prices, and to this feature they owe the success which has ever attended the establishment for so long a period. The production amounts to about forty cartons per day; a carton contains from thirty-six to seventy-two bonnet trimmings.

READING IRON WORKS, Seyfert, McManus & Co., Proprietors, Reading.—These works were established in 1839, and have grown with the prosperity of the country, until they are admitted to be, at the present time, the most extensive works of the kind in the United States, employing, when in full operation, 2500 hands. The production is of the most varied kind, and embraces armor plating, shafting and forging of all kinds for marine and other machinery; railroad axles, flat bar rails and bar iron of every description; hoop, band, scroll, rivet and horse-shoe iron, boiler plate, tank and chute iron, nails, spikes and rivets, lap-welded boiler tubes, gas, steam and water pipe, artesian oil-well and hydraulic tube, etc. The establishment includes several branches, each of which has its own distinct operations. The Reading Furnaces are two in number, one having been erected in 1872; the stacks are each 55 feet high, and the diameter of the boshes 15 and 16 feet respectively; the ores reduced are both hematite and magnetic. These furnaces are of the largest class, their average annual capacity being 20,000 tons of pig-metal. The rolling mill is of the annual capacity of 7000 tons. Its productions are round, square and flat bar iron; and hoop, horse-shoe, rivet and skelp iron. The nail mill produces 50,000 kegs yearly. The tube works produce annually 26,000,000 feet of lap-welded boiler tubes, oil-well tube and casing, etc. At the sheet mill are turned out about 8000 tons of plate, bar and sheet iron. The steam forge was erected in 1852, and has five hammers in use, weighing from 750 pounds to ten tons. It is capable of producing all kinds of marine forgings and shaftings, armor plate, car wheels and hammered bar iron. During the War of the Rebellion, one marine shaft was made at this forge which weighed forty-two tons. The heavy armor plating used on the Government ram "Dunderberg" was forged here, as were also the heavy forgings for the steamers of the American line. The Scott Foundry and Machine Works is one of the most extensive establishments of the kind in the country. Its production consists of rolling mill machinery, blowing engines, boilers and condensers, hydraulic presses, pumping machinery and all the different varieties of engines. The air furnaces in this foundry have a capacity of sixty tons of melted metal, and the cupolas of forty tons. The machine shop is fitted up with the largest class of tools, capable of finishing the heaviest kind of work. During the war, ordnance of the heaviest description, as well as projectiles, were finished here in large quantities, and the entire establishment was exclusively devoted to the wants of the Government for several years. There are facilities for erecting the entire plant of rolling and plate mills, blast furnaces, etc. The large condensers in use in the American line of steamers were made at this foundry, and all the shafting and forging made at the steam forge for the same steamers finished. The entire works constitute the largest combination of industries in their section of the country. The firm have an office at 631 Chestnut street, Philadelphia, where the business of the Reading Works, and also of their other establishment in Camden, New Jersey, is attended to.

SPARKS' SHOT TOWER, Thomas W. Sparks, Proprietor: Office, 121 Walnut street, Philadelphia. This time-honored structure was the first erected in America, its foundation stone being laid July 4th, 1808. It is a singular fact, that the United States had been obliged to depend upon Europe to supply her with an article deemed indispensable, and no effort whatever had been made prior to the date above mentioned to manufacture shot. When the embargo was laid on trade with Great Britain, in 1808, two enterprising and patriotic Philadelphians, John Bishop and Thomas Sparks, decided to build a shot tower. An auspicious and memorable day witnessed the commencement of an enterprise, and over two-thirds of a century have elapsed since its inception. The same tower then erected stands to-day, in Carpenter street between Front and Second streets. From the level of the pavement to the summit of the building the distance is 145 feet, and the foundation extends 25 feet under ground, the supporting walls being 32 inches in thickness. For sixty-seven years has this fabric withstood the storm—a monument to the honest bricklaying of our grandfathers. It is also an evidence of the architectural skill of Philadelphians of the early part of the century, for the members of the United States Lighthouse Board

have frequently repaired to its site to copy the model and afterwards re-embody it in a lighthouse. The senior member of the firm of Bishop & Sparks was a strict and conscientious member of the Society of Friends. When the War of 1812 broke out, and heavy orders were received from the Government for the manufacture of bullets, etc., he retired from the business, for conscience' sake, and left Thomas Sparks as the sole proprietor. In 1838, Thomas Sparks, the second of that name, and the nephew of the then proprietor, became associated with his uncle in the manufacture of shot and for lead, and at his death, in 1855, took charge of the business, continuing it until his death, which occurred October 8th, 1874, since which date it has been operated by his son, Thomas W. Sparks. The establishment manufactures on an average five tons per day, although it has a capacity of twenty tons. The bullets are manufactured in a separate building, and the late proprietor availed himself of having the most perfect machinery, by means of which he was enabled to manufacture bullets as perfectly spherical as the drop shot. During the War of the Rebellion, the works were run to their fullest capacity in making conical bullets.

JAMES FALLOWS & CO., Manufacturers of Japanned and Plain Tin-ware, Papier Mache and Tin Toys, Fancy Goods, etc., rear of Nos. 51 and 53 North Third street, Philadelphia. This is a young, but a very important industry. The co-partnership dates only from November, 1874. The senior partner, however, had been for twenty five years previous to that time general superintendent for the house of C. B. Porter & Co. The business carried on is the manufacture of every variety of toys, not only of tin, but of papier mache, made by a process entirely their own—being the invention of the senior member of the firm. The most common straw paper is rendered by this process entirely fire and water proof, and by one application of paint the required gloss is obtained to make the papier mache equal, if not superior, to the imported article, and at a cost not exceeding the ordinary kind. One hundred and fifty different toys, such as horses, wagons, kitchens, etc., and a full line of house-furnishing articles, made to represent straw goods, are manufactured by this process, the patterns for the figures being made much more artistically than those usually found on sale. The dies are designed by the senior partner, and afterwards submitted to one of our best artists for finishing such goods. The preparation is peculiarly well adapted for toys, on account of its flexible and durable properties, for the most delicate and elaborate article may be thrown a great distance and yet not break; the adaptability of toys for children, so constructed, will be readily perceived. This invention is destined to work a complete revolution in the trade of the class of goods for which papier mache is adapted. The firm also manufacture a full line of tin toys—some 200 different varieties, from a tin trumpet to a full train of cars, steamboat, etc.—toilet sets, cake and spice boxes, which are japanned and ornamented by hand, instead of the usual process of decalcomania, thus giving the goods a much finer finish and richer appearance. The factory is very desirably located in the business centre of the city, and employs twenty-five hands. It is five stories high, 30 by 60 feet in dimensions, and well fitted throughout with the latest and most improved appliances for conducting the extensive operations to advantage. On the first floor is the stamping room; the second is the packing and press room; the third story is used for the office, the cutting department, machine work, etc.; the fourth floor for making up goods; and the fifth is the japanning room. On this floor are two large ovens, one of which is used for preparing the paper, and the other for hardening the paint. The familiarity of the senior partner with the manufacture of these goods, his excellent judgment in purchasing stock, and his long experience in the business, give the house advantages possessed by very few establishments in the country. Associated with him from the commencement have been his sons, Henry, aged twenty-seven; Charles W., aged twenty-five; and Frederick, aged twenty-one.

BANGOR SLATE COMPANY, Dr. J. P. Scholl, President; Samuel Lewis, Secretary; J. S. Moyer, Treasurer; Samuel Straub, Superintendent. General office, Bethlehem. This enterprise was originated by J. Scholl of Bethlehem, and Samuel Straub of Bath, Northampton county, and the company was organized, April 12th, 1867, at Bethlehem, under the general manufacturing law of the State, for the purpose of operating the slate quarries belonging to the corporation, located at Bangor, Northampton county. The property consists of fifty-five acres, and had never been previously developed. From the time when the works were started they have never been interrupted. The products are roofing and school slates, of

which 40,000 squares (each of 100 superficial feet) are the average annual yield. These are shipped to all parts of the Union, but principally to New York and Boston; and, on several occasions, entire car loads have been despatched direct to California and other points on the Pacific coast. The company employ about 200 hands, for whose accommodation they have erected fifteen tenement houses on the lands. The quarries are ably and systematically worked, and the company have achieved success as much through economy and sound judgment in management as from any other cause. For the period of their existence they are among the most prosperous in the United States. The general office is at Bethlehem; there is also one at the quarries, and one at No. 52 John street, New York. In addition to the gentlemen above mentioned, Thomas S. Foster and Francis Weiss constitute the Board of Directors.

WOODVALE TANNERY, W. H. Rosensteel, Proprietor, Johnstown. This large establishment is located on leased property belonging to the Cambria Iron Company, by whom the buildings were erected, 1870–'71, and is situated in Johnstown, Cambria county. The rental paid is $4000 per annum. The buildings are of brick and of large dimensions. There is one of 50 by 216 feet; the bark house measures 50 by 260 feet; and the leach house is 35 by 160 feet. The operations are very extended; 40,000 sides are annually tanned, giving employment to twenty-five hands. The leather produced is of very superior quality, and is principally sold in New York. The article is thoroughly appreciated by the trade, and large shipments are made by rail. The utmost confidence is reposed in the proprietor by his factors there, who make large advances of funds and hides to enable him to carry out his peculiar and extraordinary methods of tanning.

W. H. ROSENSTEEL was born, 1817, in Baltimore, Maryland, of German parents. When nine years old he commenced to work on a farm, where he remained until he was fourteen, when he was indentured to learn the tanning and currying business, with Lewis T. Forney, of Waynesboro', Franklin county. He served him seven years as an apprentice, and subsequently took charge of a small yard at York Springs, where he remained about three years. He afterward worked in various places, and at different occupations, until 1862, when he removed to Johnstown, taking charge there of McConochie's tannery, which he conducted successfully for six years. He next rented a concern at Mapleton, Huntingdon county, as he had a desire at that time to engage in business on his own account. He was there engaged for three years, and subsequently rented a tannery at Mount Union, three miles from Mapleton; continuing there until he commenced the present extended works. He is an industrious, self-reliant workman, with excellent practical ability, and is regarded as a first-class tanner.

JEHICTON PAINT MILLS, C. Edward Hecht, Proprietor, Easton. The business was established about twenty years ago, and since 1866 has been in the possession of the present proprietor, who rebuilt the mills and greatly enlarged their capacity. They are located on the Bushkill creek, which furnishes ample water power for many manufactories of various kinds. The new structure is a substantial three story building 30 by 50 feet in dimensions. On the first floor are three sets of stones and twelve iron paint mills; the other stories are devoted to mixing, packing, labelling, and storing of goods. The power to operate the machinery is furnished by a fifty horse American Turbine wheel. The capacity of the works enables the proprietor to produce 1000 tons of paint yearly, and all the different varieties are ground and mixed in oil. They are of all colors, and adapted to all grades of work. The specialty of these mills is called the "French Parlor Paint," which has become very popular on account of its snowy whiteness and superior glossy appearance. The principal paints manufactured, however, are what are used for railroad cars, which are made from the best mineral colors, carefully prepared in the most scientific manner by experts who have had many years' experience. No better evidence of their superiority and durability is needed than the fact that they are in general use by the leading corporations of the country, as well as by private parties. Among these may be mentioned the Philadelphia & Erie, Belvidere & Delaware Division of the Pennsylvania Railroad, Lehigh & Susquehanna, New Jersey Central, Lehigh Valley, Northern Pacific, Burlington & Missouri, and Canada railways. A very superior article of coach and car "filling" is also made at these mills. This is for the purpose of filling the pores of the wood, so that it may take a high polish. After being applied it saves a great amount of labor in rubbing, and enables the workman to put on a

much better surface than can be done without it. The proprietor is also the owner of a large talc or soapstone quarry, covering about sixty-five acres. He is now erecting a fine mill for the preparation of this material, which is used extensively for the lining of furnaces, forges, stoves, etc.; and, being vermin proof, is also the best possible substance for sinks, wash-tubs, etc. His office is at No. 24 South Fourth street, Easton.

KILBURN & GATES, Manufacturers of Cottage Furniture, Philadelphia. This house was established, in 1858, by Stephen Gates, Cheney Kilburn and Joel H. Gates, under the style of Gates, Kilburn & Co. The warerooms and finishing factory were then at 212 South Second street, and, in addition, the firm established a factory (then very small) at Burlington, Vermont, on the borders of Lake Champlain. The whole business of the house was at that time on a small scale, but the increased demand which has arisen for "cottage furniture" has enabled the firm to extend their operations greatly, and their transactions are now very considerable, being the largest manufacturers of these goods in the United States. The senior partner, Stephen Gates, died in 1864, when Robert G. Severson was admitted into the partnership, and the firm-name was changed to its present form. The present partners are Cheney Kilburn, Joel H. Gates, a brother of Stephen, and Robert G. Severson. The factory at Burlington stands in a lot of ground ten acres in extent, a great part of which is used as a lumber yard; about 5,000,000 or 6,000,000 feet of lumber being constantly kept in stock, a great part being under cover in substantial buildings. The building itself is of the extent of 500 feet by 50, and three stories high, and is built in the form of an L. The machinery is worked by an engine of 120 horse power. Besides the main building there are on the property two other warehouses, each of the extent of 150 feet by 40. The working capacity of the Burlington factory is about 300 hands; and about 150 to 175 more are employed at the finishing factory in Philadelphia. A railroad siding runs up to the packing room at the Burlington factory, and a canal has also been cut from the lake into the lot. By these means every facility is obtained for the receiving of material and forwarding of goods. The firm have their own fire apparatus on the ground—provided at a cost of $2000—and the employés are drilled in its use. This property was purchased and the buildings erected in 1870, before which time a shop in the town was rented. The Philadelphia premises are situated on Market and Commerce streets, and comprise six buildings. Two are on Market street, and are 45 feet by 130, and five stories high, and four on Commerce street; one of which is of the extent of 50 feet by 50 feet, and three stories high, the three others being collectively 66 feet by 100, and five stories in height, besides other buildings for storage. At both factories every modern appliance necessary for the work is in use. About half of the process of manufacture is performed at each factory, the cutting out being done at Burlington, and finishing, putting together, painting, etc., being done in Philadelphia. The production of what is known as "cottage furniture" is essentially a modern industry, and is intended to supply substantially made and carefully—even elegantly—finished furniture to that large class of people who cannot afford to pay for the higher qualities. To this class these goods afford the opportunity of obtaining a medium or even low-priced grade of furniture, which is both neat in appearance and durable, and is in every respect infinitely superior to the coarsely finished, clumsy-looking articles previously in vogue. These productions are the consequence of, and a concession to, improved modern taste, which demands some degree of æsthetics even among the less favored part of the community. The wood used by this house for their goods is the sort known as "Canada white wood," and is imported by them direct from that country. Some of this wood is also found in the northern part of New York State. It is a white and soft wood, easily worked, much finer in grain, freer from knots and susceptible of a much better finish than either pine or poplar. It is also less liable than these to be affected by moisture or changes of temperature after seasoning, and being very fibrous and porous it is more capable of retaining a painted coating. Especial care is taken with regard to the seasoning. All the lumber used by this house is piled away for two years before being brought into the factory, and then is further dried artificially in the dry houses of the establishment. It is therefore perfectly seasoned and shrunk before being worked. This furniture, in addition to the painted patterns, is finished in imitation of all the finer woods—oak, chestnut, walnut, rosewood, maple and mahogany. Large quantities of it are sent to all the Eastern and Middle States, and also to South America, Mexico and other ports. Some shipments have even been made to China.

GEORGE PLOWMAN & CO.'S STEAM PLANING, SAW-MILL, AND LUMBER YARD, Nos. 713 and 715 North Broad street, Philadelphia. This firm was established in 1866, the partners being George Plowman, Stephen and James M. Flanigan, the two latter constituting the "company." The building occupied as a planing and saw-mill has a frontage of 50 feet on Broad street, and a depth of 125 feet, built of brick and three stories in height. It is filled throughout with the most approved appliances, which are propelled by a Corliss steam engine of seventy horse power. The firm carry on the manufacture of all descriptions of building materials, such as frames, sashes, doors, blinds and shutters, wood mouldings, hydrant stocks, scroll sawing and turning. In connection with the mill the firm have a lumber yard, where they have constantly on hand lumber of every description, and which is worked to order, their specialties being flooring, fencing, and shelving. Their constant aim is to produce the most superior and reliable work, unexcelled by any other establishment. About 100 men are usually employed.

GEORGE PLOWMAN was born, 1833, in Bradford county, Pennsylvania. Having learned the trade of a carpenter, he started on his own account in that vocation at the age of twenty, to which he added the profession of builder, and so continued until he became associated with the firm as now existing.

JOHN MACOMB WETHERILL, Pottsville, was born in Philadelphia, February 11th, 1828. He is the son of Dr. William and Isabella (Macomb) Wetherill, and grandson of Samuel Wetherill, the first person to manufacture white lead and other chemicals in the United States; his son continuing the business and being the leading manufacturer in that line for many years thereafter. His great-grandfather, Samuel Wetherill, was a member of the Society of Friends; but when the Revolutionary War opened, discarded the particular tenets of that society in regard to non-resistance, and took up arms on behalf of the patriotic cause, deeming it proper in certain cases to act in defence of the right. He was the founder of the sect of the Free Quakers (sometimes called "Fighting Quakers"); and, aided by others, erected the meeting-house at the southwest corner of Fifth and Arch streets, now occupied by the Apprentices' Library, and to the building fund of which both Washington and Lafayette contributed. John Macomb received a liberal education at the University of Pennsylvania. At the age of eighteen he removed to Pottsville, where he engaged in the business of managing coal lands and mines in Schuylkill county; the family being the owners of a large number of tracts in this section, he was selected to look after their interests: it was probably the most important property in the county. When he first arrived there it was entirely undeveloped; the theories of mining were crude, and the principles of practical mining had not been applied or even discovered. The undulating character of the veins and the basins which they formed were not known. While these lands were under his management, the theories which had been broached respecting them were practically proved and applied. In their investigation he was prominent and indefatigable. Much credit, therefore, is due to him for the successful and grand results since obtained. He was always enterprising and courageous in making experiments, costing much time, labor, and free expenditure of means. He has always taken an active part in politics, and holds Democratic principles. In 1857, he was the candidate of his party for State Senator in his district, but owing to a division in its ranks, he was defeated by Robert M. Palmer. Since he attained his majority, he has always been connected with the militia; entering a volunteer company as private, and being elected successively as Major, Lieutenant-Colonel, and Colonel. At the outbreak of the Rebellion he immediately joined the army, upon the first call made by the President for volunteers. On the 19th of April, 1861, he was mustered into the service as Aide-de-Camp and Acting Assistant Adjutant-General, with the rank of Captain, and was attached to Keim's division of Patterson's command. This was a three months' service, at the expiration of which he entered the Eighty second Regiment Pennsylvania Infantry, as Major, serving with them for three years and one month; seeing much active service during its entire connection with the Army of the Potomac, his regiment forming a part of the Sixth Army Corps. A short time previous to the battle of Gettysburg (June 14th, 1863), he received promotion to the rank of Lieutenant-Colonel by brevet, for gallant and meritorious services. He served in the battles of Yorktown, Williamsburg, Fair Oaks, the Seven Days' fight before Richmond, Malvern, Chantilly, Antietam, Williamsport, Fredericksburg, Gettysburg, Rappahannock Station, Mine Run, Cold Harbor, Pikesburg, Fort Stevens, and was in the campaign on the Shenandoah under Sheridan.

His courage and general course during the war obtained for him the high opinion of his superior officers; especially at the battle of Cold Harbor, where Colonel Bassett was wounded, and the command of the regiment devolved upon him. He was mustered out of the service, September 16th, 1864, at the expiration of his term, having done his duty bravely and nobly, and shown himself a fearless soldier and a gallant officer. On his return home he resumed the management of his estates, which were sold to the Reading Railroad Company in 1871, though he continued to superintend them until July 1st, 1873. He was chosen a delegate to the Constitutional Convention, held in Philadelphia in 1872 and 1873, and gave a good account of his stewardship. In that body he served as a member of the Committee on Manufactures, Mining and Commerce. He proved himself to be a very useful member in shaping legislation for the benefit of the coal interest. He was mentioned prominently as the Democratic candidate for Congress in 1874. He has ever been a useful, honorable, and consistent member of his party; seeking no remuneration, but laboring in its ranks from conscientious and patriotic motives, never having held any public office, save in the instance already referred to.

BUSHKILL QUARRIES, George & Isaac A. Smith, Manufacturers of Lime, Limestone Curbing, Gutter Stone, etc., Easton. The present firm succeeded to the business in 1871. They obtain their supply of limestone and curbing from the celebrated quarries on Bushkill creek, which have been worked for nearly half a century. These quarries are located about one mile from the centre of the city proper, and are supposed to be inexhaustible. The bluff is eighty feet high, and the stone extends to an unknown depth; but as far as it has been exposed is of the uniform excellent quality for which it has become distinguished. This fine stone has been used in the manufacture of lime for more than forty years, and has become noted for producing the best lime in the country. Not only does it enjoy a local reputation, but it is shipped extensively to New York and New Jersey. It has the best cementing quality of any known article, and has been tested in almost every conceivable situation. It has proved to be possessed of extraordinary strength for uniting stone and brick work, and for its superior quality as a plastering lime. The lime is all wood burnt, 2000 cords being yearly required. There are four "draw" or perpetual kilns, producing 200,000 bushels per annum. A force of 100 men is required in its manufacture. The firm also furnish to farmers, for agricultural purposes, large quantities of ashes and air-slaked lime. Among their patrons for the superior lime manufactured may be mentioned the Pennsylvania, the Lehigh Valley, the Lehigh & Susquehanna railroad companies. They have introduced lately a new feature in the economy of lime burning, by the insertion of a central flue and smoke-stack into the centre of the lime kiln, suspended from the top. This is an invention patented by William S. Sampson, of New York city. The purposes of this central suspended flue are to accomplish a draft through the centre of the material in the kiln, thereby utilizing the fuel under process of combustion, relieving the walls of the kiln of the great strain caused by the heat, and bringing the mass of stone under treatment in a uniform and regular manner. This results in an increased product, at the same cost of fuel and labor—a desideratum which has long been sought. This burning or calcining of the limestone of these quarries, by means of the suspended central flue and smoke-stack, has materially added to its great uniformity of character and excellent cementing qualities, and made it more popular than ever with mason builders. This ledge of limestone having been worked so many years with such gratifying results, is considered one of the most valuable in the country. The firm are extensive dealers in various descriptions of stone, cut or uncut, and also take contracts for the stone work of buildings. They have recently opened a quarry in Monroe county, which yields a superior article of flagging, that can be supplied of any dimensions.

JOSEPH OAT & SONS, Coppersmiths, Nos. 232 and 234 Quarry street, Philadelphia. In 1829, Joseph Oat established a manufactory of copper, brass, and sheet-iron work of every description, on the south side of Cherry street west of Fourth, where he remained for three years. Finding his business increasing, he removed to a more eligible locality, being the premises now occupied by the present firm; the building, however, being much smaller, being only 80 by 20 feet, and but two stories in height. It was afterwards enlarged to accommodate the growing business, until it is now 140 by 54 feet, and five stories high. The proprietor subsequently associated his two sons—George R. and Charles C. Oat—with him, constituting the present firm. They attribute their success to their

strict attention and reliable work, every article produced being manufactured in the most perfect manner and only the best of material being used. On one occasion, the copper pipes in Lovering's sugar refinery proving defective, the proprietor intended, as was customary, to stop the works, in order that they might be removed and repaired; but the senior partner of this firm, being applied to, conceived the idea that the necessary adjustment could be done while running, and this was effected by measuring and adding templates. Although this course was very unusual, and thought not to be practicable, it proved entirely successful and won for him great praise for his mechanical ingenuity. From the date of that novel exploit up to the present time the Loverings have been patrons of the firm of Joseph Oat & Sons.

JOSEPH OAT, the senior partner, was born, January 18th, 1796, in the city of Philadelphia. His father was in the same line of business in that city as early as 1800. He learned his trade of Israel Roberts, coppersmith, and after serving his apprenticeship became his foreman.

FULTON, WALKER & CO., Coach and Wagon Builders, Philadelphia. This business was established, in 1846, by Mahlon Fulton and James Howard, under the style of Howard & Fulton, in Hunter street above Tenth street. The undertaking was a very small one, the two partners having hardly anything, beyond their energy and mechanical skill, to depend upon; and they started the business by doing any sort of work connected with the repairing of wagons, coaches, etc. Within a year the partnership was dissolved, and the business was carried on for some months by Mahlon Fulton alone. In the early part of 1848, it became Fulton & Rhinier, and continued thus for about two years. In 1850, another dissolution occurred, and again Mahlon Fulton carried it on alone, doing principally wheelwright's work, which was his particular trade. The difficulties which were encountered in these early days of the establishment were both many and great, but were steadily met and eventually overcome. About the year 1853, Mahlon Fulton, having now made considerable progress and accumulated some capital, took into partnership his brother, John L. Fulton, and the house became Fulton & Brother. By this time the results of persistent perseverance had begun to make themselves manifest. The firm now commenced to manufacture new wagons as well as to repair old ones. They also took a lease of the lot they occupied and built on it a shop three stories high. With these improved facilities the business also began to increase greatly, and in the early part of 1855 the firm made arrangements with Adams' Express Company to do the repairing work for all the company's wagons. This was a great accession to the trade. They were now doing a fair, though still small, business, employing some twelve men, and also manufacturing to a small extent; perhaps some two new wagons per month. In 1858, the firm took a lease for five years from Adams' Express Company of a lot of ground on Pine street, below Twentieth street, of the extent of 50 feet by 110, and built a shop on it, still retaining the old factory. About this time, also, they commenced to manufacture new work for the company, in addition to the repairing work. Their trade, too, now began to extend itself beyond the limits of their city and State, many orders being received from Kentucky and New Orleans. The quantity of new work produced at this time amounted to about fifty wagons per year, the number of hands employed being about thirty. The firm were always fully alive to the necessity of keeping up with the progress of the age, and were continually adopting new and improved styles of manufacture, many of which were of their own invention, although never patented. The outbreak of the war produced at first a most injurious effect on the business of the firm, which was very discouraging both to them and their employés, several of whom forthwith enlisted in the army. This period of depression, however, quickly passed, and by the end of 1861 trade had improved considerably, and kept steadily increasing. About the end of 1862, the brothers separated, John L. Fulton taking the Pine street factory and Mahlon Fulton retaining the old establishment, which he carried on alone until 1864, the business in the meanwhile extending itself sufficiently to enable him to lease additional premises. In 1864, he purchased the property which he had till then rented, together with an adjoining lot, and increased the capacity of the factory by building a larger shop. In the same year the firm became Fulton & Walker, by the admission into it of Abram Walker, who had for some years previously been connected with the house. Shortly after this, two more lots of ground, closely adjacent, were purchased by the firm. The number of hands employed at this time was about fifty and the number of wagons manufactured had increased to about 150 per annum. In 1868, the

firm sold the whole of their premises to Massey & Co. and purchased a new property at the corner of North Twentieth and Filbert streets, extending 115 feet by 95. Here they erected a new and extensive factory, four stories high, with steam power and machinery, and all improvements. Their trade began now to develop with unexampled rapidity. In 1869, the business had assumed an important position and had established connections all over the country. The number of hands employed was about 100, and the firm were producing some 250 new wagons per year, besides a most extensive repairing trade; representing altogether a money value of about $150,000 worth of work per annum. In 1872, the firm purchased the establishment of John L. Fulton, at Twentieth and Pine streets, and worked both factories. In the same year, George Y. Shoemaker became a partner, and the style of the house became Fulton, Walker & Co. They have now in their employment about 140 men, with a pay-roll of $1600 per week, and turn out annually about 350 new wagons, besides doing a vast amount of repairing work: in all, a business of $200,000 per year. They have recently (1874) purchased some additional property in West Philadelphia, on which a new and most extensive factory will be built, and some smaller premises in immediate proximity to their present factory, in one of which their offices and warerooms are placed. In January, 1874, the firm surrendered the Pine street property, which had but recently been purchased of John L. Fulton. The house of Fulton, Walker & Co. stands deservedly pre-eminent among all establishments of the class in the country, their operations being already, perhaps, the most extensive in any country. Their factories are supplied with every possible modern appliance, and they manufacture on their own premises every item used in the production of the goods, with some very trifling exceptions. Their history furnishes an apt example of the results which are produced by the simple force of patient industry and perseverance.

MAHLON FULTON was born in Bucks county, Pennsylvania, in 1823. He attended the district school for about three months of each year of his boyhood, and worked for his living during the remainder. He was apprenticed, in 1840, to John Cornell, coach builder, of Newtown, with whom he remained for about two years, and then removed to New Jersey, where he continued the acquisition of his trade under George Lanning, and served out his time. Removing to Philadelphia, he entered the employment of W. C. Allison, the railroad car builder. He made many friends during this time, and acknowledges especial kindness from William Massey and W. C. Allison. He has been married twice; the second time to Margaret Dacre, of New Jersey.

CHIDSEY BROTHERS, Manufacturers of Stoves, Ranges, Heaters, Furnaces, Tin and Sheet Iron Ware, etc., Easton. This establishment is just half a century old, having been founded, in 1825, by R. S. Chidsey, on the very spot at present occupied by the warehouses. In 1850, H. R. Chidsey succeeded to the business, and, at his death, A. D. and E. H. Chidsey, two other brothers, took charge of the whole enterprise. During all these years the business increased very rapidly, and became so pressing that, in 1873, C. W. Meeker was admitted to the partnership, and the firm took the style of Chidseys & Meeker. The junior partner was a practical furnace-maker and tinsmith, having been trained up to the business from boyhood under the tuition of the elder Mr. Chidsey. This gave the firm additional facilities and made the partnership one of the most efficient business organizations in the city. The buildings occupied by the firm consist of a substantial iron front structure, four stories high, 38 feet front on Northampton street and 290 feet deep, with a basement, used as a stove repair shop. This branch is made a specialty by them, having repair castings for 125 different styles of stoves. In the rear of the main building is a fine workshop, measuring 50 by 26 feet, and three stories high, where the manufacture of tin-ware and sheet iron work of every description is carried on, both for private parties and for the trade. This is supplied with a full line of tools and the most approved labor-saving machines. They employ about thirty hands in the several departments of their business. They are also very extensive dealers in hollow-ware, wooden-ware and housekeeping articles of every description. The success which has ever attended them is due not only to the superior quality of the goods manufactured, but to their promptness in their engagements, and to their energetic and persevering endeavors to keep pace with the times and to emulate the examples afforded by similar establishments in the large cities. On the 1st of January, 1875, C. W. Meeker withdrew, and the firm assumed its present title.

FRANKFORD CENTRAL MACHINE WORKS, Robert Marshall, Proprietor, Frankford, Philadelphia. These works were started by the proprietor, in 1869, in a very unpretending manner, with a small capital, and but a single boy to assist him; but he possessed energy, industry and perseverance. The first of these traits is apparent in the fact of the capacity of the works at the present time. The machine shop is 70 by 25 feet, containing the usual complement of lathes, planing and drilling machines. There are separate buildings for blacksmith shop, foundry, and pattern rooms, also fitting and erecting shops. At first the proprietor numbered among his patrons the mills and other works in the neighborhood; but his business increasing, he added to his facilities, and commenced the building of steam engines. His specialty, however, is the making of power and foot presses. In 1873, he introduced the manufacture of umbrella and pipe mountings, having special machinery for the purpose. About forty men are employed, and the products average $50,000 yearly.

ROBERT MARSHALL was born in 1837, in Ireland. He lost his father when he was three years old, after which his mother emigrated to the United States, and settled in Philadelphia. He commenced to work, when he was nine years old, in a cotton factory, attending night-school. At sixteen, he was indentured to Amer & Grier, machinists, and served his term of apprenticeship. He worked as a journeyman for three years at Wilbraham's steam engine works, and afterwards took charge of a chandelier works for Hornier & Heidrick. He remained at this establishment for two years, and then found employment at the People's Works, which he relinquished to pass a short time in a sewing machine establishment. He removed thence to Frankford, and worked for Van Kirk for seven years, and until he started in business on his own account. He is a laborious, energetic and patient man.

LEHIGH ZINC COMPANY, Bethlehem, Northampton county, Benjamin C. Webster, President; Gordon Monges, Secretary and Treasurer. Edging toward half a century ago, about the year 1832, a barren outcrop of some (to them) unknown mineral substance arrested the attention of the late Jacob Ueberroth and his neighbors, and, after having excited their curiosity (they had taken a wagon load of the ore to the Mary Ann Furnace, in Berks county, where an unsuccessful attempt was made to smelt it in the cupola), was unheeded, and would have been forgotten but for the "trained and observant eye of a studious man, who, with satchel and hammer, was passing by that way on a leisure Saturday's stroll of exploration, in 1845, and who determined the unknown mineral to be calamine, the hydro-silicate of zinc." This was William Th. Roepper, Professor of Geology and Mineralogy in the Lehigh University, Bethlehem, south. His discovery led to the development of that almost inexhaustible deposit of rich ores of zinc (calamine), Smithsonite, and blende, by which the extensive works of the company have been supplied for full twenty years. Ten years later, in 1855, an organization was effected "for the purpose of mining zinc ore in the counties of Lehigh and Northampton, of manufacturing zinc paint, metallic zinc, and other articles from said ore, and of vending the same." It was incorporated by Act of Legislature May 2d of that year, under the name "Pennsylvania and Lehigh Zinc Company," with a capital of $1,000,000, divided into shares of five dollars each. The originators were residents of New York, and the first President was Thomas Andrews of that city. Prior to this, however, in the spring of 1853, works for the production of zinc oxide in furnaces, and by a process of his own invention, were begun to be constructed by Samuel Wetherill, who had been engaged to superintend the enterprise in its various departments. The site of the company's works was purchased of C. A. Luckenbach, it being included within the original town-plot of Augusta, on the old "Luckenbach Farm." They were completed on October 12th, 1853, with a capacity of 2000 tons per annum, and at a cost of $85,000. On the following day the first zinc-white made in the United States was produced from calamine by the "furnace process" and "tower process" of Samuel Wetherill, in connection with the "bag process of collecting" of Richard Jones. Samuel Wetherill and Charles T. Gilbert conducted these works until September, 1857, making 4725 tons of zinc-white. Now the capacity of the oxide works, which are superintended by Thomas McMahon, is 3000 tons per year. Samuel Wetherill, in the meanwhile, from 1854 to 1859, had been conducting experiments for the production of metallic zinc or spelter, at works erected by him on a four-acre lot adjoining that of the Lehigh Zinc Company. Here the inventor succeeded, after many failures and great outlay of money, in producing spelter, not, however, at a cost that would warrant

him in continuing it. Hence he abandoned it. Joseph Wharton managed the "Pennsylvania and Lehigh Zinc Company's" works between September, 1857, and September, 1860. In this year the title was changed, by Act of Legislature, dated February 16th, 1860, into that of the "Lehigh Zinc Company," by which it is now known. In 1859, Joseph Wharton contracted with the company for the erection of spelter works, and for the manufacture of the metal. These were constructed by Louis De Gée, a member of the firm of De Gée, Gernant & Co., of Ougreè, Province of Liege, Belgium, who had been expressly sent for to superintend the beginning of the important enterprise. The importation of skilled Belgian labor necessarily followed, and a new and industrious element was added to the population of Bethlehem, south. André Woot Detrixhe, François Lemell and Jean Henrard, experts from the spelter and oxide works of De Gée, Gernant & Co., arrived in June, 1859, and were soon successfully engaged in the manufacture of metallic zinc, the first of which was cast in the following month of their coming. A. W. Detrixhe has ever since conducted this department of the industry, including the pottery for the manufacture of the retorts. In the next five years about sixty Belgian workmen were imported. They have exchanged the garb of the mother country for the neater dress of the American citizen, but still cling to their native tongue, thus maintaining their nationality in the little town of many nations. At present the capacity of the spelter works is about 3600 tons per year. In 1864 and 1865 a mill for rolling sheet zinc was constructed, under the superintendence of Alexander Trippel, who had been sent abroad to acquaint himself with the most desirable mode of production. The first sheet-zinc was rolled in April, 1865. The present capacity of the mill is 3000 casks, or 1680 tons per year. The company now supplies at least one-half of the home consumption of zinc in its various forms. Benjamin C. Webster, the fifth President of the Lehigh Zinc Company, has been acting manager since September, 1863. The annual yield of the zinc mines, which are situate in Saucon Valley, three and a half miles south by west from Bethlehem, is estimated to be 17,000 tons of ore, requiring 40,000 tons of anthracite for their reduction. Upwards of 600 operatives are employed in the various departments of the works. The giant engine at the company's mines is thus described by a local writer, from whose pamphlet much of this history is obtained: "This is the engine which is destined to become famous as is the house that Jack built; this is the engine whose cylinder is 110 inches in diameter, whose piston-rod is 10 inches in diameter, with a 10 foot stroke; this is the engine that can work 'comfortably,' as we are told, at 12 strokes per minute, and yet is not the least 'fussy;' the engine, each of whose four walking-beams weighs 48,000 pounds, twenty-six of whose pieces weigh each upwards of seven tons, and whose entire weight, including girders, is 1,313,300 pounds; the engine that can lift 52,800,000 pounds, or 26,400 tons, one foot high in one minute of time, with the majestic ease and consciousness of power with which an elephant lifts a straw; the engine that can raise 12,000 gallons of water per minute from a depth of 300 feet, which works day and night without rest, and whose influence is a mighty one towards transforming the subterranean haunts of Kobalt and Gnome, where, from time silurian, these spirits have sported undisturbed in the ice-cold sea that noiselessly washes the shores of their crystal kingdom."

BENJAMIN CRAMPTON WEBSTER, President, was born October 8th, 1821, in Hartford, Connecticut, where also he was educated. After leaving school, he became clerk in the office of Hon. E. D. Morgan, of New York, where he remained four years, and subsequently was clerk to the then Governor of New York for eighteen months, residing at Albany during that time, and rendering important services to the State. He next went into the ship chandlery business with Marshall O. Roberts, who offered him the concern, which was being carried on in his own name. He continued in this for several years, but eventually becoming interested in Mexican mines, disposed of his store, and removed to Mexico, where he developed a silver mine for four years. In 1850, on his return home, he became a director of the North River Bank, New York, in which he served many years. In 1852, his father, who was then Treasurer of the Society for the Promotion of a Collegiate and Theological Education of the West, died, and after settling up his books, he was elected Treasurer in his place. He held this office for eight years, working faithfully, and without pecuniary reward. In 1863, he went to Philadelphia, as President of the Lehigh Zinc Company, and in the same year removed to Bethlehem, taking the entire charge of the works and mine. His business capacities are of an exceptionally high order, and his personal qualities render him popular in the community where he resides. He was married, in 1849, to Eliza Wilbur, of New York, and has a family of three young children.

ALTEMUS & CO., Manufacturers of Photograph Albums, Blank Books, etc., Philadelphia. This firm was established in 1844, and was among the first houses in the United States to commence the manufacture of photograph albums, which are a French invention. The growing popularity of photographs as visiting cards led Isidore Fould, of Paris, in 1859, to turn his attention to the contrivance of some special method of preserving them in a better way than the then usual one of inserting them into an ordinary scrap-book. After repeated trials, he failed in being able to find a bookbinder who could prepare anything to suit him; but at length he noticed some screens or boards with three compartments folding one upon the other, each containing six cards, three on each side. He ordered similar boards made for himself, but unbroken, and these were bound into a volume, making in all essential particulars the photograph album, since so popular. For this invention no patent was taken out. The increasing popularity of photograph cards induced several other persons in Paris to prepare bound volumes for their preservation, all of these books being so made as to allow the cards to be inserted and withdrawn at pleasure. At length an application for a patent for invention was taken out by F. G. Marx, in October, 1859, and, second, by another Frenchman, who stated his invention to consist in the arrangement of the leaves of said albums, each one of them being formed of three leaves laid in close contact, and glued together, and all three grooved, the middle one being made to fit the size of the photographic card, and the other two being made to form a frame and slide; the invention having this result, that two photographic cards being inserted back to back in this frame by a beveled cut which facilitates its sliding, the leaf of the album preserves the same thickness all over, and the edge remains full. This patent, however, was not sustained by the courts. The rise of this manufacture in America dates from the years 1860 and 1861, in the former of which one of the Rothschild family brought to this country from Paris the first photograph album ever seen here. He also caused six large albums to be made for presents by the house of D. Appleton & Co., of New York. Subsequently, two book-binding firms undertook the manufacture a speculation. Portraits of the heroes of the war becoming popular about this time, together with those of statesmen, cabinet ministers, etc., aided the demand, and the production of albums rapidly became an established industry. High prices began to be paid for them, and, in addition to the home manufacture, some of the larger firms commenced to import them from France. The firm of Altemus & Co. is the principal establishment of this kind in Philadelphia, and one of the largest in the country. The factory is of the extent of 32 by 125 feet, and four stories high. The working force engaged in the manufacture numbers about 100 hands. The production amounts to 200 albums per diem, which will contain about 10,000 pictures. The books vary greatly in size, some being made to hold only 12 cards, and some 200. The price ranges from twenty-five cents to a hundred dollars. Nearly the whole work is done by machinery devised expressly for the purpose. This house is the introducer and patentee of the hinge-back album. This invention is for the purpose of strengthening the back, and preventing its cracking and breaking, while also allowing the book to be widely opened. Each leaf moves on hinges, just as doors do, the joints being made of strong leather, which are united by rods of stiff wire. This is the strongest and most useful kind of album yet invented. Beside their home trade, the house ship albums to all parts of the United States and Canada. They also are engaged in the manufacture of blank books.

CRANE IRON WORKS, George A. Wood, President; B. J. Leedom, Treasurer; George T. Barnes, Secretary; Joshua Hunt, Superintendent; John Williams, Cashier. Office 224 South Fourth street, Philadelphia. The furnaces are located at Catasauqua, on the Lehigh Valley Railroad, Lehigh county, Pennsylvania, and are six in number. Of the stacks, two are of 45 feet each, three of 55 feet, and one of 60 feet in height. The diameters of the several boshes are given as 11, 13, 15½ and 17½ feet. The ores reduced are the hematite and magnetic; the latter is obtained from the mines, in New Jersey, owned by this company. These furnaces have been several times repaired and rebuilt. Their average annual capacity is 65,000 tons of pig-iron. The blowing engine is among the largest in use in eastern Pennsylvania, and was built at the Port Richmond Iron Works, Philadelphia, by I. P. Morris & Co. It is described as a beam-condensing engine, having a steam cylinder 58 inches in diameter, and a blowing cylinder 93 inches, both with ten feet stroke of piston. Great attention has been paid at these works to improving the quality of the metal, and the brand has always been a favorite in the New

England market. They were founded, in 1839, by a company under the Presidency of Robert Earp, which proposed to reduce iron ore with anthracite coal. Josiah White and Erskine Hazard, pioneer coal operators of the Lehigh region, were interested in the scheme. The Lehigh Navigation Company presented the company with ground and water power, on condition that a capital of $30,000 was raised to push the work vigorously, and iron continuously made for three months. At a meeting held in Philadelphia $100,000 was subscribed to this end, and work commenced. The works were named after George Crane, of Wales, who claimed to be the originator of the "hot blast," and David Thomas, a former employé of his, was engaged to come to this country to superintend them. The latter is still living. The first furnace was blown in July 4th, 1840, and is still in blast. The company was successful in its enterprise, and became a vigorous corporation. Robert Earp, the first President, died, and was succeeded by Theodore Mitchell. He in turn was succeeded by G. A. Wood, in 1868.

BULLOCK PRINTING PRESS COMPANY, William H. Williams, Manager; Frank B. Williams, Secretary. Office No. 738 Sansom street, Philadelphia. Many attempts had been made from time to time in years gone by, and with varied success, to build a printing press which should unite in itself these three requisites: 1. To print with extraordinary rapidity; 2. To dispense with feeders—in other words, to supply the sheets to the press by machine instead of hand labor; and, 3. To make a perfecting press, or one which prints both sides of a sheet. The Bullock press—invented and patented by the late William Bullock—however, embodies the first successful effort to accomplish all these objects in one machine. The inventor, in carrying into practice his comprehensive conception, made an easy provision for feeding the paper from a continuous roll or web, as well as for a perfect impression. He received his first patent in April, 1862, for the press bearing his name. He subsequently mastered the difficulty arising from the necessity of separating the sheets from the roll by equal and exact measurements. The latter object was first effected by making such a separation before printing; but by a subsequent modification the paper is cut after printing; and Bullock's presses are made on either plan, as parties may desire. The company claim that, by Kellborg's arrangement, the utmost limit of production is reached, and that they can and will produce a press capable of printing per hour 20,000 perfect sheets of the size of the New York *Tribune;* or, by a duplication of forms, 40,000 sheets of the size of the Philadelphia *Ledger* or New York *Sun* during the same space of time. The self-feeding and perfecting machine has been practically applied to newspaper work, and is now in use in a number of American offices, as well as in publishing departments throughout the United States and Europe, some fifty presses being constantly in operation; and one has been extensively used on book work in the Government printing office at Washington. The advantages claimed for the Bullock press—the arrangement for cutting and for flying—are especially noticeable, on account of their ingenuity, completeness, and the remarkably skilful adaptation to the desired end. The cutting is done with great precision, by a serrated knife, which rarely needs sharpening; and the sheets are carried to their proper position by stout gum belting, to which iron grippers are attached. The arrangements for distribution are also at once simple and efficacious. From the first organization of this company, William H. Williams has had charge of the business, and still continues his connection with it. He is a native of Pennsylvania, and has used his energies in this direction with untiring effort.

WILLIAM BULLOCK was born, 1813, in Greenville, Greene county, New York. He commenced, at an early age, to learn the trade of an iron founder and machinist, with his brother; and being a close student, with very quick perceptions, acquired a good theoretical as well as a practical knowledge of mechanics. After engaging in various pursuits, and making, among other things, hay and cotton presses, he commenced the publication of a newspaper—*The Banner of the Union*—in 1849, at Philadelphia; and subsequently removed this establishment to Catskill, New York, in 1853. While residing there he made, for his personal use, a wooden press, turned by a hand crank, to which a self-feeder was attached, and which embodied the germ of his subsequent invention. Soon after this he went to New York city, where he constructed a fast press, on the planetary system, for Frank Leslie, which enabled the latter to print with unprecedented rapidity a large edition of an illustrated account of the Heenan and Sayres fight; and also perfected the automatic feeding machine. The solution of the problem of constructing a press which should at once be swift, self-feeding, and perfecting, however, was the master

triumph of his genius, and it engrossed his energies during his later years. It is a matter of profound regret, that while he was laboring on one of these presses, in Philadelphia, on April 3d, 1867, he was so severely injured by an accident that his death ensued on the 14th of the same month.

OIL PAINTED WALL PAPER COMPANY, A. Goth & Co., Proprietors, Bethlehem. This is a new enterprise, and was established, in 1873, by A. Goth and Clarence A. Wolle, under the firm-name of A. Goth & Co., for the manufacture of washable oil painted wall paper, of which they are the inventors and patentees. It is a perfect substitute for fresco painting in oil, is easier to clean than painted walls, and the ornamentation is accomplished at less than one-fourth the usual cost of frescoing. Besides possessing these advantages, it is smoother than the finest oil painting, and unaffected by dampness; the colors are permanent, and being water-proof and air-tight, it does not peel from the wall, nor allow the evaporation of unhealthy gases. Further, it can be applied without disturbing the household, and is unaccompanied by the obnoxious odor of oil painting. The designs are the work of artists, whose many years of practical experience as fresco painters, and whose thorough study of the best European models, enable them to produce the most approved and desirable fresco effects. The factory is located at No. 9 Main street, Bethlehem; the building measuring 60 by 30 feet, and being four stories high. On the first floor is a steam engine, as the motive power for grinding the colors, only the purest and finest goods being used. In the second story is the machinery for tinting the paper, which is purchased in the white, and tinted by secret chemical processes known only to the proprietors. Upwards of 100 different tints are produced. The machinery is all of their own invention, and is also patented. Adjoining this is the polishing room for polishing the bronze paper; and this room is furnished with improved machinery of original invention. Connecting with this department is the laboratory, where all the necessary chemicals are stored. On the third floor is the printing room, which contains several presses and employs many experts. Adjacent to this room is the studio, where all the beautiful designs are executed, such as fruit, flowers, game, landscapes, and other artistic and elegant designs. The most skilful artists are here employed, and the designs are purely original. The upper or fourth story is devoted to sundry purposes; here striping and imitations of fresco mouldings are produced. Here is the "block room," where the cuts are executed, and the "selecting room," where imperfect paper is cast aside and the various tints separated; all being carefully scrutinized before shipment. There is also an elegantly fitted office on this floor. In addition to this building is a four story drying house, with a hanging capacity of 4000 rolls; also an additional drying house two stories high, 60 by 30 feet, of large capacity. The firm have also a carpenter shop where they manufacture all their own packing cases; also a large room for the storage of patterns, blocks, boxes, etc. They employ several travelling salesmen, and their paper finds a market in almost every city and town in the United States, being pre-eminently adapted to all fine work for churches, halls, hotels, parlors, vestibules, and in fact wherever frescoing could be applied or is desirable. They have received the first premiums wherever their paper has been on exhibition; among which were the Lehigh County Fair, 1874; the Pennsylvania State Fair, 1874; and the Franklin Institute, Philadelphia, 1874. The senior partner is the practical superintendent of this extensive establishment, and the junior member of the firm has charge of the financial and sales department. The works have a present capacity for doing a business of over $100,000 per annum, and during the present year (1875) it is in contemplation to still further increase the product.

BIRELY, HILLMAN & STREAKER, Ship-builders, Philadelphia. This firm is the successor to three ship-building firms, all of which had their location in the neighborhood of their present yard, at Beach and Warren streets. The firm of John Birely & Son was established in 1842, on the site now occupied by the establishment. The firm of Hillman & Streaker was founded in 1851, at the foot of Plum street, and the firm of Teese & Birely was also established in 1851, at Hanover street. In 1864, these three firms were amalgamated; Jacob Birely—a son of John Birely of the old firm—Charles Hillman, and David V. Streaker, being admitted into the original firm, and removing their business and yard to the present location, the style of the house being changed to Birely, Hillman & Streaker. At the commencement of the business by the senior firm but very few men were employed, and the competition of older and well-

established firms made the undertaking a difficult and hazardous one. It was eventually successful, however, and now ranks among the most prominent industries of the State. The first vessel built by this firm was the well-known ferry-boat called "Cooper's Point," which ran between Kensington, from Shackamaxon street wharf, and Cooper's Point, New Jersey. Her length was 84 feet, breadth of beam 16 feet, and depth of hold 6 feet. The wooden ship-building trade is suffering (1875) a period of depression in this country; but it is confidently anticipated by those versed in the trade that it will in the near future again revive and show its old vigor. The process of building a ship —the oldest manufacture, perhaps, in the world— is an elaborate one, and demands the utmost precision and exactness. The model having been prepared by the architect, and the drawings made from that, the actual building begins by laying down the keel. This is placed on blocks, which are set at a proper inclination for launching, and is generally of white oak; and for a first-class ship is made of timbers twenty inches square, dowelled together to make the required length. It is grooved on both sides to receive the planking. The stern is secured to the keel by a "knee." This is a most important timber, and requires great accuracy. Next the "stern-post" is mortised into the keel, and is strengthened by an inner post. This is the backbone of the ship, and it is now ready for the ribs. The timber known as "dead wood" is filled in at each end of the keel, and the floor timbers are next let into the keel at right angles, and from the floor are elevated the curved timbers called "futtocks." The next step is the laying down of the "keelson"—stout timbers running from stem to stern, directly over and securely bolted to the keel, with two or four side keelsons, which are bolted through the floor and futtocks. The spaces between the floor and futtocks below the water line are filled with timber, and calked water-tight. The whole frame is then braced with bands of iron, and the ship is ready for the interior planking, or "ceiling," which begins at the keelson and is carried up the sides. Projecting pieces, called shelves, are placed at proper intervals, and to these the deck beams are fastened with strong wooden or iron knees. For the deck, the wood mostly used is white pine, of which wood the masts and spars are also made. Blocks or "steps" for the masts are fastened to the keelson, from which also rise posts to strengthen the deck beams. The outside planking of the ship varies from four to ten inches in thickness, and is carefully selected, as the security of the ship against leakage depends upon this part of the work being properly performed. The hatchways, ladderways and mast-holes of the deck have to be made, the bulwarks finished, the windlass set and an infinity of other work to be done; and then comes the calking, which consists in making the seams of the deck and outer planking water-tight, and is done by driving in oakum with calking-irons and covering the seams with pitch. The ship is then launched. When afloat, there is still a great deal of work to be done. Masts, yards, rigging, sails, cables, anchors, etc., are to be added, and, if a steamer, the engines to be put in. After the rigging comes the painting, fitting, etc. For the inside fittings of a ship all kinds of woods are used, varying in costliness according to the purpose for which the ship is intended; walnut, rosewood, satin-wood, etc., being often employed. The average time required for building a ship is about four months. The number of ships completely built by this firm is about ten yearly, in addition to their repairing work, for which about sixty vessels are brought to their yard every year. The yard extends 500 feet by 216, and the number of hands employed is about 150. The lumber consumed amounts to 800,000 feet per annum, representing a money value of between $40,000 and $50,000. In addition to the property owned by the firm, they also rent a lot opposite, of the extent of 80 by 100 feet. The yard is supplied with all the buildings and gear necessary, including a saw mill, and a steam engine of forty horse power. They have also a marine railway, 175 feet in length, which can haul vessels of 800 tons burthen. They have built several steamers and gunboats for the Government, and also a light-ship and light-house tender. They also build a great number of tug-boats. Of these alone they constructed thirteen during the year 1872, several of which perform duty on the Delaware.

J. A. YOST, Manufacturer of Children's Carriages, Sleighs, Sleds, Rocking-horses, Goat and Dog Carts, Velocipedes, etc., Philadelphia. This business was established, in 1831, by E. W. Bushnell, who was the first to make children's carriages entirely of wood and iron. Before his time, these convenient little vehicles had been made almost exclusively of basket, and, though really light, presented a clumsy and heavy appearance. The personnel of the house underwent in the course of time several changes, which finally terminated by the present proprietor, who had been a partner for some years,

Galaxy Pub. Co. Philadelphia.

Edwin J. Howell

becoming sole owner. The factory is of the extent of 106 feet by 56, and four stories in height, and the number of hands employed is sixty. The motive power is supplied by a fifteen horse engine. The annual production is about 6000 perambulators, or children's carriages, 2000 toy wagons, 800 velocipedes, 9000 toy sleds, besides a large number of wheelbarrows, goat carts, etc. About twenty tons of iron and steel are consumed annually in the manufacture; the springs alone, which are of steel, requiring five tons. About 50,000 feet of lumber are used per annum for the wood-work, the principal woods being poplar for the bodies, and ash for the wheels and handles. The hubs and spokes of the wheels are occasionally made of maple wood. The oilcloth for tops and linings requires some 10,000 yards, in addition to about $2000 worth of silk, rep, terry, etc. The productions of the house are strongly and substantially built, and are also light and elegant in appearance. All the materials used are of the best class. Skilled workmen only are employed, each one having his own especial branch of the manufacture, the whole being under the personal supervision of the proprietor, who is himself a skilled workman and perfectly conversant with every detail. The prices of the carriages range from three dollars up to forty-five, and some specimens have been sent out from this factory of the value of $150. The proprietor has recently patented an invention for the top or canopy for these carriages, which is a great improvement on the old style. It consists in making the top of one entire piece, which remains stiff and unbent in all positions. The iron supports at the side admit of its being easily thrown back, and when in this position a pillow can be placed in the space thus formed, and the carriage becomes an easy reclining-chair, in which a child can comfortably sleep. This improvement has been most favorably received in this country, and samples of it have been sent to England. A great variety of these goods is made by the house, the number of different styles and patterns amounting to fifty-three. The location of the factory is at Third street and Girard avenue.

HOWLETT, ONDERDONK & CO., Manufacturers of Patent Machine-made Paper Bags and Flour Sacks, Philadelphia. This house was founded, in the year 1865, by Edwin J. Howlett, who, in 1867, associated with him John P. Onderdonk, since which time the firm has been Howlett, Onderdonk & Co. Their manufactory and salesroom is situated at 520 Commerce street. The bags are made entirely by machinery, operated by an engine of ten horse power, and the firm are the largest manufacturers of paper bags in the world. The business, although comparatively a new one, is of very considerable extent, being based upon many patents and protected by them. Francis Wolle, of Bethlehem, Pennsylvania, obtained the first patent granted for paper bag machines in this country, and the second ever obtained; but his machine merely cut and made the common hand-made bag, with a seam on the side and bottom, and it did not prove a success. The invention of B. F. Rice, in 1857, was the first machine that went into practical operation, and forms the basis of all machines now in use. The Rice machine produced, with an intermittent motion, about 20,000 bags per day. Subsequently, C. H. Morgan, H. G. Armstrong and S. E. Pettee invented improvements which increased the capacity to over 200,000 bags per day. The machines in present use are, like the sewing machines, the result of the combined inventions of many minds. The paper is placed upon the machine in a roll, and the bag is fully made, pasted, dried and counted without further attention. The machines in use by this firm make from one-quarter pound to thirty-five pound bags, are of the highest style of workmanship and average 100,000 bags per day; after the bags are completed, they are packed in thousands, ready for the market. The factory employs over fifty hands, and produced the first year 25,000,000 bags. They are producing at the present time about 150,000,000 bags per year, consuming about 1200 tons of paper, although their capacity is more than double that amount. The proprietors are now manufacturing by machinery a patented "square bag," which supersedes the common hand-made satchel-bottom bag. The above inventions were made before the demand for bags was of any considerable extent, as there was a great prejudice against machine-made bags. Those who embarked in the business previous to 1868 found it very unprofitable, owing to conflicting interests and to various infringements of the patents which were at that time wholly unlitigated. In 1869, E. J. Howlett advised the formation of a joint stock company and the rigorous prosecution of all infringers; a company was formed—the Union Paper Bag Machine Company. In June, 1871, E. J. Howlett was unanimously chosen President and John P. Onderdonk, Secretary and Treasurer, since which time they have held these offices and conducted the business of the company. Perhaps more is due to those who invested their capital, and by indomitable persever-

ance and energy created a demand and developed a business before comparatively insignificant, than to those who produced the original inventions.

EDWIN J. HOWLETT was born at Richfield, Summit county, Ohio, November 2d, 1835. His ancestors were English, Joseph and Mary E. Howlett, with their family, consisting of three daughters and three sons, having settled in Richfield in 1833. There being little to induce an ambitious boy to remain in the country, E. J. Howlett left home for Cleveland, Ohio, at thirteen years of age. He first found employment in a confectionery and fancy goods store; afterwards, for six years, he was employed in the retail dry goods trade. In 1856, his employer gave him a letter of recommendation, and he started for Boston, arriving there an entire stranger. He called upon the wholesale dry goods house of Wilson, Hamlin & Co., one of the leading houses of Boston in this line, obtained a situation with them, and remained with them till 1863. His attention while there was directed to the subject of paper bags by seeing some at a neighboring store. Foreseeing in this a business that in the future would expand into one of the industries of the country, he vigorously pursued it until, in 1863, he established the house of Howlett Brothers, in New York, in which firm he is still a partner, the business being conducted by his younger brother, Henry J. Howlett. In June, 1865, he came to Philadelphia and established the present house of Howlett, Onderdonk & Co. He is a man of great perseverance and energy, and affords one of the many illustrations of the proverb, that every man is the architect of his own fortune. He has made the history of the various inventions relating to paper bag machinery his special study, and is thoroughly master of this branch of industry. Great credit is due to him for consolidating and protecting its various interests. He has shown the utmost confidence in the ultimate success of the business, and possesses great tenacity of purpose.

JOHN PERCIVAL ONDERDONK was born in New Brunswick, New Jersey, January 13th, 1838. He was educated in Rutgers College, and graduated in 1859. He established himself in business in New York, and subsequently removed to Trenton, New Jersey, as Secretary and Treasurer of the Trenton Car Company. In 1871, he became Secretary and Treasurer of the Union Paper Bag Machine Company, and is also a member of the firm of Howlett, Onderdonk & Co. He is one of the patentees of the Hebbard Car Spring, and half owner of the Hebbard Car Spring Company, Cambridgeport, Massachusetts.

JOHN McCLURE, Manufacturer of Kentucky Jeans, Brooklyn, Chester county, was born, July 26th, 1791, in Chester county, Pennsylvania, and came of Scotch-Irish ancestry. His education was only such as could be obtained in the ordinary country schools. During his minority he resided on his father's farm, where he followed the avocation of an agriculturist until 1844, when he erected a large factory building at Brooklyn, and entered into the manufacture of Kentucky jeans. His naturally excellent business qualifications enabled him to prosecute this enterprise with signal success, and having accumulated a handsome competence, he retired from active pursuits, in 1862, to spend the remainder of his life in quiet seclusion. He served as a Director of the Downingtown National Bank until the infirmities of age compelled his resignation. Throughout his life he had been ardently attached to the Presbyterian Church, in which he had held the position of Ruling Elder and Trustee. His first wife died August 22d, 1822, when he was married a second time, to Elizabeth Mackelduff, one of her cousins, February 26th, 1824. His death occurred suddenly, February 9th, 1873.

JOSEPH MACKELDUFF McCLURE, M. D., Manufacturer of Woollen Goods, Milford Mills, Chester county, the eldest son of the late John McClure, was born, April 22d, 1819, in the same place as his father. After completing his education, he studied medicine, and graduated at the Jefferson Medical College, in Philadelphia, March, 1844. His relations to the medical profession, however, have only been titular; he deemed it advisable, nevertheless, to study this profession, so that if deprived of other resources, he could find in it a means of support. Soon after his graduation he made an extensive tour through Europe; and on his return, in 1849, entered into the manufacturing business, at Milford Mills, in Chester county. During the War of the Rebellion he supplied the United States Government with a vast amount of woollen goods, and, throughout his business experience, has been mainly successful. This satisfactory result he attributes, in a great measure, to

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Jno. L. Ondendonk

his rule of invariably buying and selling for cash. He has at present two extensive factories in operation, affording employment to a large number of hands, himself giving particular attention to the progress of the works. He has for many years rendered efficient services to the establishment of the East Brandywine & Waynesburg Railroad. Like his father and grandfather, he is a devoted member of the Presbyterian Church, and a Ruling Elder of the same. In 1872, he was elected by the Presbytery of Chester county, a Commissioner to the General Assembly of that denomination, and was present in that body at its annual session, at Detroit, Michigan, May, 1872. He was married, July, 1856, to Henrietta McConnell, of Honeybrook, Chester county, Pennsylvania.

WOODRUFF SLEEPING AND PARLOR COACH COMPANY, Manufacturers of Parlor and Sleeping Coaches, Philadelphia. This company was organized in 1870. It derives its name from Colonel Jonah Woodruff, who, in conjunction with his brother, Theodore T. Woodruff, was the original inventor and patentee of sleeping cars. The first of these cars, which was somewhat crude, was devised and brought out by Theodore T. Woodruff, in 1858. Shortly afterwards, Jonah Woodruff joined his brother, and the two became engaged together in the development and improvement of railroad sleeping cars. In 1862, Theodore T. Woodruff retired, leaving the whole business in his brother's hands; since which time Colonel Woodruff has taken out a great number of different patents for various sleeping, parlor, and palace cars. In 1862, for the purpose of working the sleeping car business on an extensive scale, a stock company was formed under the title of The Central Transportation Company. It was incorporated by the Legislature of Pennsylvania, with a capital of $200,000, which was increased in a few years to $2,000,000. Within seven years, in 1869, this company had constructed 119 sleeping cars, which it had in operation on sixteen lines, including the Pennsylvania Central, Baltimore & Ohio, Pittsburgh, Cincinnati & St. Louis, etc. In 1868, by a vote of the shareholders, the company leased its business to George Pullman, the Woodruff patents and improvements—numbering over a hundred—going with the lease. Upon this Colonel Woodruff separated himself from the company, and produced a new sleeping car on an improved plan, which combined many of the best features of the old car with others of later conception. He secured a patent on this car, which is called "The New Woodruff Rotunda Car," and established the Woodruff Company to operate it. Two of these cars, named "The Lady Washington," and "The Lady Franklin," were built by Harlin, Hollingsworth & Co., of Wilmington, Delaware, and were completed in May, 1871. During this time, a suit was brought against Colonel Woodruff by the Pullman Company for infringement of patent rights. When the case came up for trial, in November, 1871, the suit was withdrawn by the Pullman Company. Shortly afterwards the two new Woodruff rotunda cars were taken to Indianapolis, and a contract was entered into to run them on the Indianapolis, Peru & Chicago Railroad, between Indianapolis and Chicago. Early in 1872, two rotunda cars were put on the Cleveland, Columbus, Cincinnati & Indianapolis Road, to run between Cleveland and Cincinnati. In September of the same year, two coaches were placed on the line between Indianapolis and Detroit, via Eel river, and, in October, two more were put on the Chicago, Danville & Vincennes Road. In June, 1873, four rotunda parlor cars were put on the Camden & Atlantic, between Philadelphia and Atlantic City. The company continued to build the cars as arrangements were made with different railroads, and it has now in full operation some thirty cars of this description running on various roads. From Indianapolis, Louisville, Chicago, St. Louis, Cincinnati, Cleveland, Detroit, and Evansville several of these cars are daily despatched. These cars are built at the Jackson & Sharp Company's Car Works, at Wilmington, Delaware, after plans and specifications furnished by Colonel Woodruff, and cost from $18,000 to $20,000. They weigh about twenty-one tons, or about four to six tons less than other cars now in use. The body of the car rests upon six-wheeled trucks, and is supplied with springs made by the Pittsburgh Cast Steel Works. The length of the body of the car is 54 feet; the height, 10 feet; the width, 10 feet. One of the most noteworthy merits of the present Woodruff car is, that the upper berths are so arranged as to remove all the weight—amounting under the old plan to about four tons—from the top of the car, thereby rendering it less liable to danger from vibratory motion, especially when rounding curves. And further, the sleeping accommodations being in the day time placed under the seats and floor, makes the ventilation more complete. At each end of the car is a rotunda, containing wash-bowls, water-fountain, closet, etc. Above is a water tank, con-

taining twenty gallons. A lamp hangs from the centre, and the apartment can be isolated from the main saloon by the sliding of a door. The main saloon is thirty-six feet in length, and is fitted in the richest manner. The panels are of walnut wood, picked out with golden arabesque. The fittings, curtains, carpets, and upholstery generally, are of the finest class. The saloon is lighted with five globe lamps, the oil in which is not inflammable. The cars are warmed by the Baker heater, by which all possibility of fire in the event of the car being overturned by an accident is entirely prevented. Two of these cars have been subjected to severe tests; one having been thrown from the track and dragged a long distance; and another having fallen through a bridge, and down a twenty feet embankment. In neither case was any serious injury sustained by either the car or the passengers. This company has been a most successful one. Though in operation but two or three years, it has regularly paid a dividend of 10 per cent., and its business is still increasing. The principal offices of the company are at 804 Walnut street, Philadelphia. The officers are Jonah Woodruff, President; Augustus Trump, Secretary; and J. R. Sweeney, General Superintendent.

JONAH WOODRUFF was born in Watertown, Jefferson county, New York, April 21st, 1809. He left school in 1819, and, for several years, assisted his father upon the farm, meanwhile studying portrait painting. This art he practised with great success. In 1838, he took an active part in the Canadian Rebellion, holding a colonel's commission in the patriot army. Since his connection with the sleeping car interest, he has devoted all his energies to the promotion of that enterprise, of which he has made a most remarkable success.

CHARLES F. BECKEL'S IRON FOUNDRY AND MACHINE SHOP, Bethlehem. This establishment is the pioneer of the many similar enterprises in the Lehigh Valley, having been founded by the present proprietor in 1825, just half a century ago. The original locality was on Main street, Bethlehem, Northampton county, where, in a small shop, he manufactured such articles as plow and stove castings and other light articles, and a single horse then sufficed to furnish the motive power. The population of this rich valley soon increased, and the proprietor was compelled to seek more commodious quarters. He accordingly constructed suitable works in what is known as old South Bethlehem, Lehigh county, on the banks of the canal; and these works are operated by water power. The main building is 30 by 50 feet, two stories high. The first floor is occupied as a general machine shop, and is fitted up with all modern appliances, and the latest improvements in labor-saving machinery. In the second story is the pattern shop, which is filled to overflowing with a valuable collection of patterns of various kinds. Adjoining the main shop is a foundry, 30 by 60 feet, where are produced all descriptions of green and dry sand castings. The productions of this establishment consist in part of bridge, house, and mill castings and irons, ore and quartz crushers, horse and steam hoists, pumps, and machine work generally. He is also the manufacturer and patentee of "Beckel's Improved Brick-set Heater," an article unexcelled by anything of the kind in the market. The claims of superiority of this heater over many others consist in its simplicity, durability, cleanliness, and economy. It has only been introduced two years, yet upwards of sixty have been used by the citizens of that section alone, who have uniformly testified to its excellence and usefulness. The proprietor is ably assisted in his business by his son, Charles N. Beckel, who is a practical iron bridge builder and machinist. He acquired his knowledge of the bridge business under one of the most prominent engineers and bridge builders in the country, and, therefore, has a complete knowledge of all its details. He constructs and erects the celebrated Whipple Truss Bridge, a strong, substantial structure, in which only the best quality of iron is used. Although but a young man, he has erected upwards of thirty iron bridges in different sections of the country. All the iron work of these structures is manufactured in their own establishment. The proprietor of the foundry and shops, although now seventy-five years of age, is vigorous, energetic, and industrious, as when he commenced business fifty years ago.

JAMES S. MARSH, Iron Master and Manufacturer of Agricultural Implements, Lewisburg, was born, November 26th, 1821, at Scipio, Cayuga county, New York, and passed his boyhood years on a farm. When fourteen years old, he was apprenticed to a tinsmith, at Auburn, New York, continuing at this trade until he reached the age of nineteen, when he purchased from his employer

GALAXY PUB. CO. PHILA.

THE GIBBSBORO WHITE LEAD, COLOR & VARNISH WORKS

John Lucas & Co. Philadelphia.

the unexpired term of his indentures. After a short interval as a journeyman, his attention was directed to Pennsylvania, as a more inviting field for his exertions. With a friend, he started on a prospecting trip, having as his capital $250 in money, and his habits of industry and perseverance. He was induced to locate at Lewisburg, in Union county, where he established himself in the stove business, supplying the farmers with his wares, and receiving from them their notes in payment. With these he paid the foundry-men for the castings required in his shop, and after a few years of uninterrupted exertion and perseverance, was enabled to purchase the foundry, and include that in his business. To the manufacture of stoves and other iron and tin work, he subsequently added that of agricultural implements. The business became also enlarged, and changed in character from time to time through new co-partnerships. In 1853 he established an iron furnace at Dry Valley, near Lewisburg, in which he still retains a large interest. He is an innate mechanic, and from boyhood has exercised his inventive faculty. When but seventeen years old he obtained a patent for an invention, which was but the beginning of a series of like products of less and greater value. Among those which deserve particular notice is "Marsh's Self-raking Reaper" and automatic raker, the main principle of which has been adopted by a majority of the reaper manufacturers throughout the United States, and, in fact, it is superseding all others. He is also the inventor and manufacturer of what is known among agriculturists as the "Valley Chief Reaper," which is already extensively used and rapidly growing into favor. He has lately added to his extensive interests a furnace at Northumberland for the manufacture of pig-iron.

GIBBSBORO' WHITE LEAD, COLOR AND VARNISH WORKS, John Lucas & Co., Proprietors. The senior partner of this house, about the year 1849, commenced the business of dealing in paints, oils, and the necessary adjuncts of the house painter, himself attending the counter, and conversing freely with the purchaser. By this means he learned what was greatly needed by the trade—a green paint, heavier in body, and at the same time, when used by the workmen, not detrimental to their health. He at once commenced a series of experiments in an improvised laboratory, and, after laboring diligently, produced an article which fully answered the requirements of the painter. With the view of securing a locality whereon to erect a factory, which should be in the vicinity of the city, and at the same time contiguous to water absolutely pure, free from any impregnation of iron or lime, he selected the site of the present works at Gibbsboro', on the line of the Camden and Atlantic Railroad, near White Horse station, Camden county, New Jersey. At this locality, in 1852, the present enterprise was begun, and the works have gradually increased from time to time, as the business required, or additional articles have been added to the list of manufactures. The purity of the water, which is a small lake, and the head of Cooper's Creek, enables the firm to produce the various colors, at the same time of the richest and the most delicate tone. In this enterprise he was first associated with Joseph Foster, an old and experienced color manufacturer, who remained in partnership with him until 1857, when he withdrew. William H. Lucas, brother of the founder of the firm, now became a member of the same, and to the latter is intrusted the charge of the warehouse, Nos. 141 and 143 North Fourth street, which includes the salesrooms and the financial departments; while the senior partner devotes his entire attention to the chemical and manufacturing duties of the establishment. These embrace the beautiful permanent Swiss and Imperial French Greens, now so favorably known and so extensively used throughout the United States and Canada, and which have almost entirely replaced the Paris or arsenical greens formerly employed. The white oxide of zinc, that prominent desideratum in the trade, is also manufactured by this firm, and has been pronounced by the best judges not only superior to any produced in this country, but as fully equal to the world-renowned "Vielle Montaigne Co.'s" preparation. Their pulp steel, Chinese blue, and primrose chrome yellow have superseded the French and English articles, and these are now used by all the leading paper-hanging manufacturers in the United States. To these have been recently added the manufacture of white lead by a new and improved method, discovered by the senior partner, for which he has received letters patent; and in 1872, he also patented a new mode of preparing liquid paints. The works have lately been provided with new and improved machinery for the manufacture of these articles; and a large addition has also been erected for the production of oils and varnishes, comprising the best qualities of coach, furniture, and paper varnishes, fully equal to the best imported. Of the amount of material produced, in a finished state, some faint idea may be formed when the capacity of a single

hydraulic press is such that it can turn out several tons of green pigment per hour; and all the other branches of manufactures are on the same extensive proportions, the whited productions of the works averaging many tons each day. All the prominent articles used by the painter and paperhanger are here manufactured, colors of every variety and shade, primary and compound. To give a detailed account of the various departments of the Gibbsboro' works, and the *modus operandi* of its various fabrications, would cover many pages beyond the limit of a sketch; but the leading facts already recited are enough to convince the reader that the establishment is one of the most extensive in the country, and daily increasing in the quantity, quality and variety of its productions. The shipments of the Swiss and imperial French greens alone, to points beyond Philadelphia amount to several hundred tons yearly.

CORDAGE WORKS OF JACOB RINEK'S SONS, Easton. This establishment was founded by Jacob Rinek, in 1840, who carried it on until 1863, when, having admitted his three sons, Thomas, John, and Henry (who had each been thoroughly trained in the works to a full knowledge of the business), the firm-name was thenceforth known as J. Rinek & Sons. This firm, however, was dissolved, in 1868, by the death of the senior partner, when the three sons assumed the present style, and, in 1874, admitted their youngest brother to a participation in the concern, the name of the firm remaining the same. At the outset of the enterprise, the proprietor carried it on by hand labor, employing a few hands. Such was the excellence of his productions that his orders continually increased, and he was obliged to add to his resources, until the establishment became one of very large dimensions. The works are situated on Bushkill creek, about one-half mile from Easton. The factory proper, where the hemp is prepared and spun, is a substantial brick structure, especially adapted for the purpose. It is filled with the most improved labor-saving machinery, driven by steam power, furnished by a one hundred horse Corliss engine, supplied with steam from two large boilers. Much of the most valuable machinery was invented by the proprietors especially for their own use. Several of the machines are worthy of special notice, as they are exceedingly ingenious and efficient. One on the third floor, for slivering hemp, is the invention of John Rinek, and has been patented both in England and America. It is termed a hemp preparing machine, and, for hetcheling, is superior to anything ever devised, besides being very durable, and not liable to get out of order. After the material is prepared, it is taken to the second story, where the spinning is done, and is then ready for the "walk," which is 1500 feet long. Here is to be found another very valuable machine, also the invention of the same gentleman, who has obtained letters patent for it from the United States. It is called the "six-flyer rope forming machine," which forms six strands, of exact length and thickness, at a very rapid rate, with fully three-fold speed over the ordinary method. It entirely overcomes the difficulty of jerking the yarn off the bobbins, and obviates the tangling of the same in making smaller sizes of cordage. It forms the strands very solid, so that the rope is more even and better made than by any other method. It is the only machine in use for the purpose, and its inventor is now introducing it to the trade. In addition to the factory and "walk," there is a large stone warehouse, 42 by 80 feet in dimensions, where the raw material is kept, and where a large stock is constantly on hand. The capacity of the works is about 1000 tons of rope per annum, valued at $300,000; and, when working on full time, at least one hundred hands are employed. The productions have a high reputation, and find a ready market in all parts of the country.

ADAMS & KEEN, Morocco Leather Manufacturers, No. 934 St. John street, corner of Canal, Philadelphia. The business dates from January, 1851, when the senior partner, William W. Adams, commenced the manufacture of morocco, with A. Garhart and S. Walton, who formed a co-partnership together. The works were located at the site still occupied by the present firm, and the amount of cash capital invested in the business was $1000. They had scarcely been in operation three months when, by the failure of one of their customers, they lost all they had embarked in the enterprise, except about $10. They recuperated, however, after this unforeseen loss, and were doing very well, when, in two years time, nearly all they possessed was again swept away by another of their customers failing to meet his engagements. A second time they recovered from the shock, and were steadily pursuing their avocation, when a third bankruptcy was announced, by which they lost $4150, and within $300 of their total assets.

Adams & Garhart now purchased S. Walton's interest in the business, and the remaining partners carried on the establishment until 1858, when the firm dissolved, and the present senior member, after a short interval, associated with him Kennard Keen, constituting the firm which thenceforth was and still is known as Adams & Keen. With every successive year thereafter the business increased, and, up to the present time, the stock manufactured, for fineness of quality and durability of texture, is second to none in the market. The number of hands employed, in 1851, was but eight; these have been increased to sixty in 1875, all of whom are skilled and competent men. The original building was a small three story brick, 60 feet front and 16 feet deep. The present structure is a five story brick, 80 feet front, with a depth of 130 feet, very conveniently arranged for the business. In 1851, the sales for the year amounted to $25,000; at the present time these average $290,000 per annum. The articles manufactured are kid and morocco leather, the specialties being Curacoa kid and Tampico moroccos. The goods are known all over the United States from Maine to California, and quite large shipments are made to Canada. The salesroom occupies a portion of the ground floor of the building on the corner of Canal street. William E. Adams, a son of the senior partner, who served a regular apprenticeship to the business with the firm, has an interest in the house. He is a thorough, practical, industrious young man.

WILLIAM W. ADAMS was born, 1827, on Franklin street below Callowhill, in the old district of Spring Garden, Philadelphia, and is a son of Timothy Herbert Adams, also a native of the same city. His grandfather was among the first to introduce machinery for cotton manufacturing in the State. After receiving a fair education, he served an apprenticeship with Christopher and George Bockius, learning the morocco business at their establishment on Willow east of Second street; continuing with them as a journeyman for some three years after attaining his majority, and until he started at his present location. Two of his sons are at present in the employ of the firm.

KENNARD KEEN was born, 1834, in St. John near Coates street (now Fairmount avenue), in the old district of the Northern Liberties, Philadelphia, and is a son of Eli Keen, a native of southern New Jersey. His father being in the shoe business, the son became, in a measure, identified with that of leather and morocco from boyhood. After leaving school he familiarized himself in this calling, by which he was enabled to enter the firm of which he is now so important a member.

PHILADELPHIA IRON AND STEEL COMPANY, John P. Verree, President. No. 939 North Delaware avenue, Philadelphia. The manufacture of iron was commenced at the present locality in 1845; although Verree's Mills had been in operation many years previous, dating from 1817, at a distance of ten miles from the old city of Philadelphia, in what is now the Twenty-third Ward of the consolidated city. In 1845, the Penn Rolling Mills were established by individual enterprise, the President of the Philadelphia Iron and Steel Company being a member of the co-partnership, which continued, with various modifications, until the present corporation was organized. At the commencement of the works, thirty years ago, but six hands were employed, and the products were 150 tons of sheet-iron yearly. There are now 125 operatives employed, and fully 6000 tons of general manufactured iron are manufactured per annum. Beside all kinds of bar iron, and of special shapes to suit purchasers, iron beams, angles, ties, and railroad supplies are fabricated. Among the specialties are railroad joints, bolts, hoops, and bars.

SCHUYLKILL HAVEN ROLLING MILL COMPANY, Weissinger & Medlar, Proprietors, Schuylkill Haven. This company was established, in 1872, by Weissinger & Bast; in 1874, the latter disposed of his interests to the present junior partner, —— Medlar, and the firm-name became Weissinger & Medlar. The works are located in the busy manufacturing town of Schuylkill Haven, about four miles from Pottsville. They are situated directly between the Reading Railroad and the Schuylkill Canal, thus affording double transportation facilities. The buildings are three in number, substantially and spaciously constructed. The rolling mill is 80 by 120 feet, and contains two annealing furnaces, two trains of rolls—one of ten inches and the other of eighteen inches—a set of T rail rolls, three sets of shears, and one circular saw for cutting rails. Two large engines—one of fifty, the other of one hundred horse—furnish the motive power. Adjacent to the mill are the two other buildings; one is 80 by 50 feet, for the storage of

finished work, and the other is a stock room 50 by 75 feet in dimensions. A side track extends from the railroad directly into the mill. Other noticeable features are a set of immense scales of 85,000 pounds capacity, manufactured by Richle Brothers of Philadelphia, and a handsome, well-appointed office, the latter so arranged as to command a view of the whole interior of the mill. About sixty hands are at present employed, and twelve tons of manufactured iron are produced each day, with a capacity for double that amount in busier times. The manufactures consist of refined and double refined bar iron, American bar iron, T rail, etc. They run from three-eighth to three inch round and square iron, and every thickness of flat, from three-quarter to four and a quarter inches in width. They make a specialty of superior T rail, and furnish almost all the leading collieries in the anthracite region. The excellent quality of all this company's productions is conceded by every dealer and worker of iron who has been fortunate enough to procure it; and beside being the most noted brand in the busy mining and manufacturing districts adjacent to the mill, the shipments of the company extend over unlimited territory, while their trade is rapidly on the increase. They at present have a contract for supplying the new Chain Cable Works, just erected in this vicinity, with large quantities of their superior iron, to be manufactured and welded into chain. Both the proprietors have a complete and thorough practical knowledge of the iron business in all its details. No establishment in this section of the State enjoys a more enviable reputation, all of which has been achieved through the untiring energy and masterly business ability of the senior partner; while the junior member of the firm adds new strength to the future of this establishment.

PLUMB'S PATENT JIGGER, for separating Ores, Coal, etc. This machine is the invention of William H. Plumb, and is intended to supply a want long felt by the coal operator, in separating the slate from the coal as mined. The existence of a considerable proportion of this foreign article in every ton of anthracite has ever been a troublesome and expensive fact with which the operator has had to struggle. It is true, he has availed himself of manual labor, as supplied by boys, who are proverbially careless unless well watched, and even then more or less slate passed through the screening machines with the coal. Some years ago it occurred to some one that the difference in the specific gravity of the slate and the coal offered a method of solving the difficulty; that by immersing the freshly mined coal and slate in water, and agitating them, the slate, being the heavier, would sink to the bottom, rendering the separation easy. Various experiments were made and machines invented; the most successful of the latter—Bradford's Separator—did the work of many boys, but after all required boys to make the work tolerably good; and unless these boys were looked after, the refuse, which should be all slate, was found to be so rich in coal as to pay well if passed through a better machine. Plumb's Patent Jiggers meet the desired end. These machines are made entirely of iron, in the most substantial manner. They are portable, only requiring two bed timbers on which to rest. The power to operate them is very small, as they are balanced in such parts as require lifting or vibrating. Two sizes are manufactured, weighing five and ten tons each, with a capacity of 100 and 200 tons, respectively, in ten hours. The entire mechanism is placed inside and above a cast-iron tank, six or seven feet in diameter, funnel-shaped at the bottom, and forming, with this tank, a compact, solid machine. The tank being filled with water, the coal—as it comes from the breaker—is fed into a central hopper at the top, falling into the middle of a perforated receptacle which has a rapid up-and-down motion. At the bottom of this, in the centre, is an opening for the discharge of the slate, which is easily regulated. As the machine works, the slate settles in this receptacle. The coal, being lighter, is caught on an inclined and perforated discharging rim, which moves up and down eight times in a minute. When it is down, the coal, suspended in the water, is thrown on it by the current of water acting from the centre towards the circumference; when it rises to the outer edge of the tank, the water falling back through the perforations, the coal falls over into iron chutes which carry it to the coal pocket. The slate, which settles on the inclined bottom of the receiving vessel, acts as a valve or valves, and it is gradually discharged through the opening at the bottom of the funnel part of the tank, where it falls on the shelves of a carrier. This carrier brings it up without loss of water, and discharges it into the chute leading to the slate pocket. This coal jigger is almost automatic, simply requiring to be fed with coal, and power from a steam engine to do its work, and dispenses entirely with boys. The laws of gravity and motion part the pure and impure better than manual labor can effect it, and above all, the use of water in the separation makes the coal thoroughly clean before it is shipped in the

cars for market. Three of these machines are erected at the Lehigh & Wilkesbarre Coal Company's works, at Hauto, in the Nesquehoning valley; two are in operation at Kohinoor Colliery, Shenandoah; three are at the Middle Lehigh Company's colliery, New Boston, Carbon county; two at the Hickory Coal Company's mines, Gilberton, Schuylkill county; and two at Old Forge, in the Wyoming valley, Luzerne county. The inventor, William H. Plumb, resides at Mauch Chunk.

COLUMBIA FURNACES, Grove Brothers, Proprietors. These works are located in the borough of Danville, Montour county, on the line of the Catawissa Railroad, and are two in number. The height of the stacks are 39 and 50 feet; the boshes are each 14 feet in diameter. The ore reduced at these works is the fossil iron. The estimated capacity of the furnaces is placed at 13,000 tons per annum; the actual product in 1872 being 10,686 tons of pig metal.

JOHN ALBERT, Manufacturer of the American Star Violin, Philadelphia, was born at Liel, Baden, Germany, June 24th, 1809. He is an only son; and his father, Ignatius Albert, was a wheelwright. As a boy he was very studious and passionately fond of music. He was not very robust; and so his father, instead of attempting to bring him up to his own trade, wisely determined to let his son's genius have its bent. At ten years of age, having learnt all that could be learnt at the primary school he attended, he persuaded his father to allow him to receive private lessons to prepare him for a pedagogium. These lessons he received from the village priest, who also gave him lessons on the organ. At this time there was some thought of preparing him to be received in the Teachers' Seminary at Rastatt; but, as his parents could have procured the necessary means only by great sacrifices, this project was abandoned. Accordingly, he devoted himself wholly to music, and would walk miles to receive a lesson on the violin or clarionette, and every spare hour he gave to the manufacture of musical and mathematical instruments. In the year 1830, his father's existence ceased, and he was then induced to enter a mercantile establishment in Basle, Switzerland, at the same time continuing to write music, repair instruments, give lessons, etc. This lasted for about six years; after which, having acquired a good name and received excellent testimonials, he tried to establish himself on an independent footing. So in the year 1837, he engaged in the dry goods business, linen weaving, etc., establishing himself at Malterdingum, Bombach, and Freiberg. At the same time he continued to make many inventions; but, owing to his not possessing a capital in proportion to his enterprises, he was forced to sell out, and the fruits of his inventions enriched only the purchasers. But during this time his industry and perseverance had not remained unnoticed; and so, after the failure of his enterprises, he was engaged as business manager of the famous "Universitates Mechanicas Link." This position he held till 1848, when he had to resign it owing to the part he took in the revolution of that year. His trial lasted for three years, during which time he was under political inquisition. Ultimately he was induced to emigrate with his family to this country; and, after a long and stormy voyage, he found himself in Philadelphia bereft of all means of subsistence beyond what he was able to obtain by the sale of a few violins, which from their great age and fineness he had kept sacred. At length he obtained work with Matthias Keller, maker of violins, and was eventually able to purchase the business situated on Third street above Green. At this time he made all his violins by hand, and also did much repairing, being acquainted with the technical and mechanical part of the entire branch. During this period he experimented largely. He obtained woods of three countries—Germany, Italy, and the United States—and after many trials found that violins made from the wood of this country were superior to any others. For the fronts and sides pine is used; for the backs curly or birdseye maple. John Albert then became actuated by a desire to compete in price with the European trade. To do this it was necessary to use machinery. This he had to invent and manufacture for himself. His first application for a patent was made in 1863; but it is only within the last twelve months that he has brought his violin cutting machine to such a state of perfection that he can now make an exact copy of any violin. In the manufactory, now situated on Ninth street above Sansom, are models in bronze and steel of all violins of celebrated makers, both ancient and modern. The principal violin made in this establishment is the American Star Violin, being a combination of the Amati, Stradivarius, and Guarinarius. In addition are made tenors, bass viols, violoncellos, table and bow zephyrs, guitars, æolian harps, etc., etc. John Albert has devoted a fortune and a lifetime to this

manufacture, and the results are just beginning to be seen. He has seven children, one of whom—Eugene Albert—takes an active share in the management of the mercantile department of the establishment.

DAVID THOMAS, Iron Master, and the father of the anthracite iron trade, was born, November 3d, 1794, near the celebrated ruins of Neath Abbey, in Glamorganshire, Wales, and is the son of a small farmer. His father being comparatively a poor man, and having several children, his son was obliged to go to work on the farm at a very early age, and forego any ambition he had in the way of education; and, beyond the merest elements of learning, he is altogether a self-educated man. In 1812, when seventeen years old, he commenced work in the Neath Abbey Iron Works, where he remained for five years, employed in the blast furnaces there, showing a wonderful aptitude for the business, and gaining a vast store of experience even during that time. So well did he occupy his time and talents that, in 1817, he went to Ynisced-wyn, in the neighboring county of Breconshire, where he was made general superintendent of the blast furnaces and the iron and coal mines. He occupied that position for twenty-two years, operating his furnaces in the most successful manner, and continually experimenting with anthracite coal as a smelting fuel. It so happened that the Ynisced-wyn Works actually stood alone on the only belt of anthracite coal in Great Britain—a belt nearly eighty miles long and from one to two miles wide; and yet, with this bountiful supply of magnificent fuel lying under their very works, they were hauling coke to their furnaces from a distance of fifteen miles. The superintendent naturally argued that when fuel and ore lay together as they did there, the fuel must be suitable for smelting the ore, provided the right process of doing so could only be ascertained. With this aim in view he began, as early as 1820, to make experiments. He had some anthracite coal put into the furnace with coke, in the proportion of from one part in twenty to one part in twelve. This did very well; but whenever anything went wrong with the furnace the fault was always laid on the coal; and the men became so prejudiced against it that it was given up. Still, every year he would try some experiments both in cupolas and blast furnaces. In 1825, he had a small blast furnace erected, with a 9 feet bosh and 25 feet stack. After blowing it in with coke, he introduced anthracite coal, increasing the amount of it by degrees; but the tuyeres would close up, so that it was abandoned. In 1830, this furnace was enlarged, giving it a bosh 11 feet in diameter, with a 45 feet stack. This resulted in a greater amount of success; yet the whole thing was so unprofitable that it was given up. While he had been thus experimenting, another's brain had been devising, and at last perfecting, an invention which was to create a revolution in blast furnaces, and enable him to reach the goal of his ambition. That invention was the hot blast. In 1828, Mr. Neilson, of Glasgow, Scotland, began to experiment in that direction, and, in 1834, he patented his valuable invention—the heating of the blast before introducing it into the furnace. In those days news travelled slowly, and it did not reach the ears of David Thomas ere two years had elapsed. By that time the Clyde Iron Works had a hot blast furnace in operation, and he hurried off to Scotland to witness its workings. After the most careful examination, he determined that the new hot blast was the requisite for the anthracite furnace. He returned to Ynisced-wyn with a license from the inventor and an expert mechanic, who understood the construction of the heating ovens. The furnace was prepared for the new blast, the heating ovens were attached to it, and on February 5th, 1837, the furnace was blown in. The success was complete, and anthracite iron continued to be successfully and profitably made from that furnace without intermission. Anthracite iron was a new-born commodity in the commerce of the world, and David Thomas, of Ynisced-wyn, was its godfather. For a long series of years the owners of the great anthracite coal fields of Pennsylvania had been awaiting success, for the Lehigh Coal & Navigation Company had also experimented, expending large sums of money in building a blast furnace where iron could be made by means of anthracite coal. They succeeded in making some anthracite iron; but their trouble was to keep the furnace in blast; and the result was the same as in the early series of Mr. Thomas' experiments: they were forced to abandon it. But in the summer of 1838, they read in the columns of the London *Mining Journal* of the great success the previous year at Ynisced-wyn, and, in the following November, one of their leading directors crossed the ocean to witness the process and learn all about it. Proceeding at once to Wales, he found the Ynisced-wyn furnaces in full and successful operation. The result of his visit was that Mr. Thomas was offered and accepted a five years' engagement to go to the United States and see what he could do with an anthracite furnace in the

Lehigh valley. He arrived in this country in June, 1839. The Crane Iron Company of Catasauqua was immediately organized, and in the following month the construction of the first of the present six furnaces was commenced. It had a bosh of 11 feet and a stack of 47 feet. The first run of iron was made July 4th, 1840, with the most encouraging success; and that furnace has run on steadily until the present time, making—small as it is in comparison with the giant furnaces of to-day—its 180 tons of pig-iron per week with praiseworthy regularity. Other furnaces, meanwhile, had been constructed in various parts of the Lehigh and Schuylkill valleys, for the purpose of making anthracite iron, but all had lamentably failed. To Mr. Thomas, then, there is undoubtedly and justly due the credit of having built the first anthracite blast furnace in this or any other country which successfully fulfilled the purposes for which it was constructed. In 1854, he built the two first furnaces of the Thomas Iron Works, at Hokendauqua. This company has now six furnaces at that point and two at Lock Ridge. In addition to his interest in the Thomas Works, he is a large shareholder in the Carbon Iron Company, which has three furnaces at Parryville; in the large rolling mills at Catasauqua, and other iron enterprises; and is also largely interested in coal mines and ore beds. He was married in 1817, and has had ten children, of whom only four—two sons and two daughters—are living. He resides at Catasauqua, surrounded by every comfort and luxury, and yet without ostentation. His sons and sons-in-law, who are associated with him in business, are gathered all around him, while his great-grandchildren prattle on his knees; and although he has passed the age of four-score years, he is as upright and more vigorous than some men twenty years his junior. He attended the Iron Masters' Convention, February, 1874, at Philadelphia, and was unanimously elected its President—a graceful and well-earned compliment.

MANAYUNK MACHINE WORKS, Muldoon & Hutton, Proprietors, are located at Manayunk, Philadelphia. They were established, in 1846 or 1847, by Nice Keely, who erected the original building, about 36 by 115 feet. From the date of founding there were various changes until January 1st, 1857, since which time the present firm have operated. They added a new foundry about 1864, of the dimensions of 50 by 36 feet; the whole building being two stories in height. They use the most approved mechanical appliances suited to their branch of industry—the machinery being propelled by a fifteen horse engine—and give employment to about fifty men. This firm—who are millwrights, machinists, and iron founders—produce mill gearing, shafting, and pulleys, as well as pickers, willows, and fulling machines of the latest improvement, beside doing every variety of jobbing and repair work.

WILLIAM WOOD & CO., Manufacturers of Cotton and Woollen Goods, Philadelphia. This house was established, in 1858, by William Wood, eldest son of Thomas Wood, of the Fairmount Machine Works. In the year 1860, the business was removed to the building now called the Mount Vernon Mills, at Twenty-fourth and Hamilton streets, which still forms a part of the present factories. The business increased, and more space was from time to time taken up by the works, until they embraced the whole building. In 1861, William Wood associated himself in partnership with John McGill, and the firm-name was changed to William Wood & Co. In 1867, to meet the increasing trade of the house, additional premises were secured, embracing the area of ground from Twenty-first and Hamilton to Twenty-second, and thence to Spring Garden streets. The factory now (1875) covers four acres of ground and occupies seven buildings. The original building—still in use, and known as the "Mount Vernon Mills"—is 100 feet square and three stories high. The new works—known as the "Pequea Mills"—include six buildings, covering an area of four acres. The building used for storage and stock rooms and repair shops is of the extent of 260 by 60 feet, and two stories high; the dye house is 180 by 70 feet; the spinning and carding department is 200 by 60 feet and four stories high; the building for weaving and finishing extends 220 by 42 feet, and is five stories high; the preparing department—a single story building—is 130 by 70 feet; and the fire-proof storage room is 60 by 40 feet and two stories in height. The working force employed by the firm numbers over 700 hands, many of whom are women. The machinery—consisting of 650 looms, and spinning machinery and all appliances—is worked by three engines of 300 horse power collectively. The production consists of cottonades, from which is manufactured the grades of clothing in use by the working classes, and of which this house make every variety; also wool mixture suitings, jeans, plaid flannels and shawls. Great quantities of

these goods are turned out by this firm, and are shipped to all points in the United States and Canada. The goods, though including many degrees of quality and many styles, are all those which are chiefly in demand by the mass of the people, and the sale is consequently very large, amounting in the aggregate to the value of $1,000,000 annually. The manufactures of this firm being varied according to the demands of market, necessitate a wide range of consumption of raw material—which directly and indirectly has amounted to 500,000 pounds of wool and 4000 bales of cotton in a single year. The raw material used is bought by them at first hand; the cotton in the Southern, and the wool in the Western States. They also sell their goods directly to the dry goods jobbers, and have a trade covering every section of the country. The house is the most extensive individual manufacturers of cottonades in the country.

WABASH MILLS, Preston & Irwin, Proprietors, Manayunk, Philadelphia. In the beginning of September, 1820, Charles V. Hagner purchased a water-power of fifty inches of the Schuylkill Navigation Company, and commenced building a mill, employing some twenty hands in its erection. Having finished his mill he put it into operation for making oil and grinding drugs, and, shortly afterward, added a fulling mill, and had Alfred Jenks, then of Holmesburg, make him a number of power looms for weaving satinets. These were the first power looms used in the manufacture of woollen goods in Pennsylvania. The upper portions of his mill were successively occupied by Mark Richards & Co., Moses Hey. and Joseph Ripka, and thus this establishment became the birth-place of the large mills afterward conducted by those men. The mill was owned and operated by C. V. Hagner until 1839, when John Winpenny purchased both it and the dwelling and converted the former into a woollen manufactory, adding a new building; but as it approached completion the structure was destroyed by fire, in July, 1839. It was immediately rebuilt and put into operation by John Winpenny & Bro., early in 1840. The mills started with three sets of machines for making broadcloths and kerseys, and employed some fifty hands, consuming about 1200 pounds of clean wool, and producing about 1000 yards of goods per week. The firm of John Winpenny & Bro. was dissolved, July 1st, 1847, by the withdrawal of Samuel Winpenny, and, January 1st, 1848, Joseph Winpenny was admitted to partnership as John Winpenny & Son, which continued till February 14th, 1853, after which the business was continued by John Winpenny alone until his death, September 7th, 1856. The mills were rented for a brief period to Philip A. Rickards, and, in 1858, the management was assumed by Edward Preston, Jr., and Bolton Winpenny, as Preston & Winpenny, who introduced the manufacture of cotton and woollen goods, and continued to operate until the spring of 1860, when Preston withdrew; and, in the spring of 1861, Samuel Winpenny associated in partnership with his nephew, and, after a short but remarkably successful career, Bolton Winpenny became sole proprietor. Under this management, by the introduction of improved labor-saving machinery, the original productive capacity of the works were fully doubled, though the buildings were not enlarged. The buildings included a five-story building, 40 by 135 feet, a two-story dye-house, 65 by 40 feet, a two-story storehouse and assorting room, 60 by 38 feet, and all the necessary additions. He consumed daily about 2500 pounds of wool, employed about 135 hands, and produced about 2500 yards of cloth per day. The mills were run exclusively by water-power. Preston & Irwin having purchased, February 23d, 1872, have since introduced steam-power and are still operating them.

CALVIN ADAMS, Inventor and Manufacturer, was born in Oak Hill, Greene county, New York, June 26th, 1810. His early education was somewhat limited, consisting chiefly of the three primary branches—reading, writing, and arithmetic—usually taught in the country district school. His attendance at school was irregular, seldom covering more than the three or four months during winter. After leaving school he learned the wagon-making business, and worked at it for some nine years. He also devoted much of his spare moments during his early life in experimenting in iron casting, to enable him to produce perfect malleable iron. He succeeded in this art, and carried on this business at Oak Hill for a number of years. For the purpose of extending his business, he moved to Pittsburgh in 1838, and, in partnership with John G. Raggen, made the first malleable iron west of the Allegheny mountains. He began business on the corner of Grant street and First avenue, and the building of the furnace was under his direct supervision. This furnace was the nucleus of the Novelty Works.

In 1839, L. R. Livingston was admitted as partner, the firm-name becoming Livingston, Roggen & Co. In 1840, Calvin Adams invented a coffee-mill, and did a large business in its manufacture. Up till 1848, he was continually devising new labor-saving machinery, by which his business would run unobstructed, owing to a lack of sufficient skilled labor. In 1848, he made some very valuable inventions in locks and door latches. Owing to the great demand for his various manufactures, he found it necessary to secure more capital and extend his works, and in 1849, he associated with him J. K. Moorhead and William B. Copeland, and did an extensive business in the manufacture of scales, malleable iron castings, and numerous other useful articles. The establishment from this time was known as the Novelty Works, where Calvin Adams was considered the sole inventor and patentee of nearly all, if not all, of the products turned out of the establishment. In 1872, he retired from the Novelty Works and connected himself with ——— Jarvis, and erected a large brick foundry, where he immediately commenced the manufacture of a number of novelty goods, and is still engaged. He has no military record, the only warlike spirit in the family being his uncle, Captain Curtis Thorp, who entered the ranks during the last war with Great Britain, in 1812, and served with distinction till the close. In 1842, Calvin Adams became an Odd Fellow, and in 1845, a Free Mason. In 1846, he was elected to the Select Council of Pittsburgh, where he served for three successive terms. Owing to his pressing business, he was compelled to decline a re-nomination for a fourth term. He has subsequently been urged to fill various political offices, but has declined invariably. He is a member of the Protestant Episcopal Church, and for the past thirty years has been a vestryman for St. Peter's and Trinity Churches respectively, and during the erection of Trinity Church was one of the members of the Building Committee. Not only does he possess a fertile mechanical genius, but he is also a successful financier. In 1866, he became a partner with James T. Brady, in the banking business and remained with him some six years, when he withdrew. For a number of years previous to 1872, he was one of the Managers of the House of Refuge, holding the office of Treasurer; and for several years was a member of the Board of Managers of the Dixmont Insane Asylum. At present he is a Director of the Second Ward School, of Pittsburgh, a Trustee of the Dollar Savings Bank, and a Director of the Union Insurance Company, of Pittsburgh, and like a number of Pittsburghers, has speculated and operated in oil and oil territory since its first discovery, in 1857.

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PEKIN MILLS, Sidney J. Solms, Proprietor, Manayunk, Philadelphia. The site upon which they stand was purchased of the Schuylkill Navigation Company, by Moses Hey, who erected the original mills, four and a half stories in height, 48 by 100 feet, and operated them until about 1836, when they were purchased by Joseph Solms, and by him enlarged, improved, and then operated until his death, July, 1852, since which time they have been run by the present proprietor, a son of the former. S. J. Solms subsequently raised the original mill to full five stories in height, and, in 1862, erected a new mill, about 90 by 48 feet, also five stories in height, to which is attached a four-story building, about 60 by 60 feet, occupied as engine house, picker, dyeing, drying houses, etc. To the original mill is attached a two story building, about 75 by 30 feet, occupied as engine and boiler house, etc. The whole contains fourteen sets of woollen machinery and 256 looms, with all necessary appliances for preparing and finishing. The motive power is obtained from two steam engines of 125 and 80 horse respectively. When running to full capacity they consume about 600,000 pounds of prepared stock, and produce about 1,500,000 yards of doe skins and tweeds per annum, giving employment to about 250 hands. The establishment produces everything except the warps consumed from the raw material, and is complete within itself. A portion of the original building having been destroyed by fire in 1864, it was rebuilt and operations resumed with the least possible delay. The mills are now under the superintendence of Louis Grebe, who has been connected with them since 1838.

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ARCOLA MILLS, James B. Winpenny, Proprietor, Manayunk, Philadelphia. This site has been used for manufacturing purposes over half a century. On May 6th, 1825, the Schuylkill Navigation Company sold to Thomas B. Darrach (who had previously been operating a portion of William J. Brooks' Mill) a water-power of 100 inches. In the same year he erected the original structure, three and a half stories in height, and 64 by 45 feet in dimensions. He occupied a portion of the building, when completed, for making hat bodies;

and the remainder was used by James Darrach, who operated two sets of machines for the manufacture of cloth. About 1837, the former relinquished his portion of the mill, and both branches were continued by the other occupant alone, until he associated with him James Shaw and Peter C. Erben, who together carried on the business. Subsequently James Darrach withdrew from the firm, and, in the course of time, was followed by Peter C. Erben, leaving James Shaw as sole proprietor, and he so remained until 1855; the latter was probably the last manufacturer of broadcloth in the country. To him succeeded the present occupant and proprietor—who had previously been engaged, with some thirty hands, in the manufacture of yarns at Joseph McDowell's Mill. He leased the premises, and converted it into a cotton mill. He now employed about sixty hands, and successfully operated the establishment. Having purchased the property, in 1863, from the Darrach estate, he proceeded to improve it, and in 1865 erected a new three story building, 50 by 45 feet. In 1871, he added to the main mill a four story building, 36 by 45 feet, and raised the old building to a height of four stories. The property, which is included between the canal and the river, at Manayunk, occupies a lot about 120 by 150 feet. The mills contain over 5000 spindles, with the necessary preparatory machinery, consuming some five bales of cotton per day and yielding during the same period about 2000 pounds of cotton warps and yarn, for the manufacture of hosiery and white counterpanes, and employing 120 hands. During the war the mills were converted into a manufactory of army blankets; but shortly after the close of hostilities the proprietor resumed the spinning of cotton yarns, the excellent quality of which has won for him an enviable reputation.

McCALLUM, CREASE & SLOAN, Carpet Manufacturers, Philadelphia. This establishment is one of the oldest, if not absolutely the oldest, carpet manufactory in the United States. Their store and warehouse, which is a handsome marble building, is on Chestnut street, in the city of Philadelphia, and their works are situated in Carpenter street, Germantown, originally known as Trullinger's lane, on the banks of a creek known as Crab creek, or Paper Mill run, from which at first the motive power of the factory was drawn. The business was established on its present site, in 1830, by the brothers Andrew and William McCallum, who had emigrated to America from Scotland some two or three years previously. In the following year, 1831, they purchased the property from James Burke, the then owner. It consisted at that time of a three story stone building, which, though it had passed through several hands, had been constantly used by its various occupiers for the purpose of woollen manufacture ever since its erection, in 1813, by Jacob Clemens. The factory is situated in a valley in which there is a well-defined echo, and this circumstance suggested to the brothers the name of "Glen Echo Mills," by which the works are known throughout the United States, and even in Europe; the word "glen" being used in remembrance of their native Scotland, where the term is common. The capacity of the mills in those early times was necessarily small. The number of hands employed during the first year or two was not more than twenty-five or thirty, and the production was proportionately moderate. For the first three or four years the water power of the run was used to drive the machinery of the factory; but in 1835 a steam engine of ten horse power was erected. During this time a great part of the spinning and weaving was done for them by other mills in the neighborhood of Germantown. As their capacity increased, however, they gradually transferred the whole of their spinning and weaving to the mills in Carpenter street, making from time to time additions to the buildings and increasing the motive power by larger engines and boilers until, in 1868, the capacity of the works was double that of previous years. In 1853, a fire occurred in the mills, which destroyed a part of the main building and much machinery, and somewhat reduced the production. During the War of the Rebellion, the firm was extensively engaged in the manufacture of army blankets, at first under a sub-contract with those supplying that article to the Government, and afterwards under a direct contract. For some portion of this time the mill ran night and day, and was worked by two sets of hands. This house, now about completing half a century's existence, has grown with the growth of its particular industry, and with that of the State and country, and is now a representative house. The works cover an extent of two acres; a force of 350 hands is employed, and the machinery is driven by an engine of 250 horse power, with seventeen sets of cards. Their chief production is extra-super ingrain carpets, a class of goods which, though not by any means the finest manufactured, is the kind most in demand for general use. In this specialty the firm lead the trade, producing the best carpets

of this description which are known either here or in Europe, as is shown by the fact that the "Glen Echo" can always command a higher price than any other kind. Of this ingrain they turn out in its various grades, inclusive of stair carpeting, about 1500 yards per diem. The firm spin all their own yarns; and, besides the advantage which this gives them in their own manufacture, they are enabled also to do a large trade in supplying yarns to other manufacturers; the quantity of worsted and filling yarns produced for this purpose is about 1800 pounds per diem, in addition to what is required for their own mills. The consumption of wool is about two and a-half million pounds per annum. In addition to their large manufacturing interest, this firm also carry on an extensive jobbing business and are the largest importers of carpets and wools in Philadelphia. The stock at their store on Chestnut street embraces every possible variety. The members of the firm were at first the two brothers, Andrew and William McCallum. In 1841, on their adding a city warehouse to the business, Charles J. Hendrickson was admitted into the partnership. In 1855, Andrew McCallum died and Charles J. Hendrickson retired, leaving the business in the entire control of William McCallum. In 1859, Hugh McCallum, Orlando Crease and Andrew J. Sloan were admitted into the firm, and the style became McCallum & Co. In 1866, William McCallum retired from active participation in the business, when the firm-name was altered to its present form.

WEIMER MACHINE WORKS, Weimer & Birkinbine, Mechanical and Civil Engineers, Proprietors, Lebanon. These works were established, in 1856, by William Weimer and his son, P. L. Weimer; two other of the senior partner's sons were afterwards interested in the enterprise, but these have since withdrawn. William Weimer is now dead. Early in 1874, John Birkinbine, son of the well-known engineer of that name in Philadelphia, became associated with P. L. Weimer in the business, and the new firm proceeded to reorganize the engineering department of the business, so as to enable them to prepare, when ordered, plans, specifications, estimates, etc., for iron smelting furnaces, water works, mills, mines, etc., complete. The facilities of the works were improved, a large increase was made in the tools, and these, with the heavy stock of important patterns and the valuable patents which they control, enable them to contract for, construct and erect complete plants for blast furnaces and other large industries. The works occupy about seven acres of ground, nearly five of which are covered with buildings. Here are produced plain and cast coil tuyeres, P. L. Weimer's Patent Shell Coil Tuyeres, tymp coils, water-backs and general furnace fixtures; railroad cars at the rate of sixty four-wheel cars per week; all descriptions of water work machinery; steam engines of all sizes, high pressure, condensing and compound; also bells for farms, plantations, workshops, ferries, fog signals, etc. Of these, two kinds are manufactured: the cast iron bell, commonly termed the Amalgam Bell, and P. L. Weimer's Patent Rotary Bell. This is a cast iron bell which revolves while ringing; the mechanism is simple and effective, causing the bell to make a partial revolution at each stroke while in the act of ringing, thus preventing the hammer or tongue from falling on the same place, in consequence of which action greater durability of the bell is obtained. A special diploma was granted them at the Pennsylvania State Fair, and special premiums have likewise been received from a large number of county fairs. The cheapness of these bells—costing less than one-sixth the price of brass metals of the same size and tone, aside from their durability—have caused them to be favorably known in all sections of the country. The works give constant employment to a large force of operatives, ranging between 300 and 400 in number. The firm also have an office at No. 152 South Fourth street, Philadelphia.

DAWSON & SHAW, Manufacturers of Woollen Goods, occupy the main portion of the Sciota Mills, at Manayunk, Philadelphia. The present firm succeeded, January 1st, 1874, Dawson & Robinson, who commenced operations in this place in August, 1872. They run four sets of machines, seventy four looms and all the necessary preparatory and finishing machinery, driven by a large water-wheel, supplied with an abundance of water from the canal. They usually employ about fifty-four hands in the various departments. The cotton and wool are received in the raw state, and they send out goods ready for the market, producing about 550 pounds of yarn and 1500 yards of heavy woollen cords per day, while upon lighter goods the amount of production is correspondingly increased. The mill contains the most approved mechanical appliances, and the productions, under

the management of the firm, who are masters of all the practical details of manufacture, have an acknowledged superiority.

WILLIAM DAWSON was born in Lancashire, England, October 10th, 1822. He served an apprenticeship in his native country to printing calicoes and silks. In 1837, he came to the United States, and proceeded to Bustleton, Pennsylvania, where he entered a print works and remained there for a period of eight years. In 1845, he removed to the Falls of Schuylkill, and entered Simpson's works, where he passed two years. In 1847, he went into business for himself at Conshohocken, removing to Manayunk in the month of November of the same year, where he engaged in mercantile pursuits. He was Superintendent of the Manayunk Gas Works for seven years, and then entered the Sciota Mills. He was appointed, by President Lincoln, Postmaster, and occupied the office until the expiration of his term. He was one of the Guardians of the Poor in 1858–'59.

WILLIAM SHAW is a native of Yorkshire, England, where he was born, June 2d, 1825. At the age of seven years he began to work in the mills, and his education was obtained in the night schools. He became thoroughly conversant with the cotton manufacture in his native country, and with this valuable knowledge in his possession came to the United States. He landed, June 25th, 1847, and repaired at once to Samuel Bancroft's mills, in Delaware county, where he remained six months; and thence went to W. T. Crook's Woollen Mills, in the same county, where he was employed for five years. From this point he departed to seek an engagement in the cotton and woollen mills of Thomas Kent, in Upper Darby, and there served about two years and a half, returning thence to Crook's mill for a year. In the spring of 1857, he went to the cotton and woollen mills of Boyle & Cunningham, on Cobb's creek, and remained some two years and eight months, until near the close of 1859. He next found employment in Patrick Scantlin's mill, in Montgomery county, and tarried with him until the latter part of 1863. His next sphere of labor was at Shaw & Esrey's mill, on Chester creek, where he was engaged until the autumn of 1865, when he went into business on his own account in the Union Mills, Chester. He manufactured woollen jeans, having one set of machines, twenty looms and employing eighteen hands. In February, 1869, he disposed of the concern, and subsequently became manager for Eli M. Broomall (now Robert Hall & Son), where he continued until August, 1871. He then went to New Castle, Delaware, and became manager for James G. Knowles, with whom he remained until he embarked in the present enterprise

EDWARD W. MILLER'S BIBLE AND PUBLISHING HOUSE, No. 1102 and 1104 Sansom street, Philadelphia, was established in 1831, and is believed to be one of the oldest in the United States, having a continuous existence under the same management. The editions emanating from this house have attained a wide popularity throughout the country, and several of the most prominent and prosperous subscription houses, principally of city papers, have received their supplies from this establishment; their "Popular Family Bible" is claimed to be the cheapest and best subscription book ever offered to the public. The manufacture of Bibles has ever been a specialty; and the most approved machinery is to be found in the press room, all the appliances being on a heavy scale and operated by steam power, whereby the best kind of work is produced in the shortest possible time. In addition to Bibles, the proprietor commenced, in 1835, the publication of the "Southern Harmony," a book of music, by William Walker, which became very popular and has been extensively patronized, as may be inferred from the fact that the many editions have reached about 500,000 copies, the sales being almost without a parallel. The "Christian Harmony" is another popular music book by the same author, first issued in 1867, and is meeting with similar success, the sales increasing every year. The proprietor is a practical book-binder, who commenced that business forty-four years ago and has prosecuted it with persevering industry and success ever since. About 1841, he associated with him Samuel D. Burleck, one of his journeymen, and the business was carried on under the firm-name of Miller & Burleck for fifteen years, when it was dissolved. In 1871, he admitted his son, Francis H. Miller, to an interest in the business; and in 1875 another son, Alfred W., also became associated with him in the affairs of the house, it being his intention to educate them thoroughly in the several departments before he withdraws from active pursuits, when they will take the management of affairs exclusively under their own control. The success that has attended the business has been due to the strict integrity and honorable dealing of the proprietor, and to the superior quality and moderate prices of his goods.

Stuart, Peterson & Co. Stove & Hollow-ware Foundries, Philadelphia

EDWARD W. MILLER was born January 21st, 1811, in Philadelphia, and is the son of Christian and Mary Miller, both natives of Pennsylvania. His education was obtained in that city, and after leaving school he learned the business of bookbinding in the establishment of Joseph G. Auner, at (old) No. 333 Market street, west of Ninth street, with whom he remained nearly six years. Before he attained his majority, he started in business on his own account, with a cash capital of $9, at the corner of Nectarine and Eighth streets, and employed one man and a boy; and from this modest beginning he has expanded into the heavy establishment above described.

INTERNATIONAL PAINT COMPANY, C. Edward Hecht, President; H. T. Buckley, Secretary; E. H. Hamman, Treasurer; Elijah Warne, Superintendent. Principal office, No. 22 South Fourth street, Easton. This company was organized, in 1869, by Elijah Warne, having for its object the manufacture of raw and burnt umbers, raw and burnt siennas, Vandyke brown, four shades of Indian reds, Venetian reds, golden ochres, yellow oxide of iron, dross black, ivory black, supra black, brown and red, brown metallics, etc. The materials used in the production of these various pigments are mined both in Pennsylvania and New Jersey. From the crude articles thus obtained, various processes are necessary to convert them into the colors above named, which are claimed by the company to be fully equal to the best grades of the imported article. Indeed, these products enter directly into competition with those of foreign manufacture, and are gradually taking their place. The establishment is taxed to its full capacity, being in operation by day and night. It is one of the largest establishments of the kind in the United States.

PITTSBURGH FLINT GLASS WORKS, Bakewell, Pears & Co., Proprietors, Pittsburgh. These works were established as long ago as 1808, by Benjamin Bakewell, Benjamin Page, and Thomas Bakewell, constituting the firm of Bakewell, Page & Bakewell, for the manufacture of flint glassware, on premises located at the corner of Grant street and Monongahela wharf. At the outset of the enterprise they met with many difficulties in discovering the proper materials, seeking for and training workmen, etc.; but ultimately succeeded in establishing an extensive business. In 1832, Benjamin Page retired from, while John P. Bakewell entered, the firm, which now adopted the style of Bakewells & Co. In 1842, John P. Pears became associated with the house, and the firm name was changed to Bakewells & Pears, so continuing until 1845, when, by the admission of Benjamin P. Bakewell, there was a still further change to Bakewell, Pears & Co. During this last named year, the great fire occurred, and the works suffered total destruction, but were rebuilt on the same site, and continued in successful operation until 1853, when the property was sold to the Connellsville Railroad Company. The establishment was then removed to the present locality on the south side of the river, where, in December, 1854, the firm started with two furnaces of ten pots each, employing about 150 hands, and have continued to manufacture flint glass in large quantities. The success which attends their business is attributable to their long experience, the excellent order and system pursued, resulting in the superior character and quality of the goods produced. The partners at present composing the firm of Bakewell, Pears & Co., are John P. Pears, B. B. Campbell, and B. Bakewell, Jr.

STUART, PETERSON & CO., Manufacturers of Hollow Ware, and Stoves, Heaters and Ranges, Philadelphia. This firm was established in 1844, on the present site. The works are located on Noble and Broad streets, and occupy an area of 90,000 square feet. The house is engaged extensively in the manufacture of stoves, of which they make about 500 a week, or 27,000 per annum; but their specialty is the production of hollow ware in all its varieties. To the improvement of this class of goods the firm have devoted especial attention, and have succeeded in turning out such superior work that articles of their manufacture have a marked preference in all markets. Besides their improvements in the size and shape of the goods, both of which are important points in the manufacture, they have developed new processes of finishing, enamelling, and tinning, in which respects their goods are literally unequalled, either in America or Europe. In the process of finishing preparatory to enamelling or tinning, the firm have a peculiar advantage in consequence of owning the monopoly of an ingeniously constructed lathe, on which they expended over $20,000. The object of

this lathe, which is called the Automatic Turning Lathe, is to make smooth the inside of the sauce-pan or kettle, as a preliminary to tinning or enamelling. In England, and usually in this country also, this process is performed in a hand-lathe, the workman using a chisel or tool, with his hand upon a rest; this plan has the disadvantage of not securing entire uniformity of surface, and also causes the health of the workmen to suffer from their inhaling minute particles of the iron. In the lathe in use in this foundry, these objections are removed. The vessel, after having been annealed, is put into the lathe, in which a tool is so fixed as to conform to all the irregularities of the surface, automatically making the inside bright and smooth, and stopping when the work is done, as if of its own accord. This process gives a clean, porous surface, to which the enamel adheres with great tenacity. On this lathe patent-rights have been secured both in this country and in England. The enamelling process is also peculiar to this house, and is performed in the following manner: the inside of the hollow ware, after being prepared by the steam lathe, is covered with a white paste, the composition of which is a secret, and then put into an oven to be dried. After drying, it is transferred to another oven or furnace, which is heated to a white heat, sufficient to melt glass. The heat here fuses the dried coating, making it soft as liquid glass. While in this state it is quickly taken from the oven, rapidly covered with a white powder, and immediately returned back to the oven, where it is again subjected to a white heat, and finally taken out, to be gradually cooled in the open air. The intense heat which is used to enamel these wares is required in consequence of not employing a lead, or other deleterious oxide. The purity of this enamel makes it in great demand for chemical purposes. The enamel is, in fact, a regular coating of porcelain upon the metal, and, with ordinary care, is imperishable. The English enamelled iron ware, on the contrary, finally runs into an infinitesimal number of minute cracks, which chip off. The English productions have been nearly driven out of the American markets by the manufactures of this firm. The tinning process, though not so complicated as the enamelling, is still interesting. The best government banca tin is melted in a cast-iron vessel with a proportion of sal-ammoniac. This is poured into the vessel to be tinned, the latter being placed over a fire. The composition is then rubbed on the inside surface with a cork until thorough amalgamation takes place by the chemical affinity of both metals. The outside of the ware is japanned with a preparation which is fixed by heat, and leaves no smell, which the ordinary gas tar generally used invariably does. The variety of articles to which the patent enamel is applied is very great; sauce-pans, boilers, stew-pans, sugar moulds, evaporating dishes, kettles, glue-pots, wash-hand basins, milk-pans, etc., etc. The tinned or patent metal hollow ware also includes a large number of vessels. The variety of articles which are produced in plain turned hollow ware is still larger. What is called "ton hollow ware" is made chiefly for the Southern market, and is so called because it is sold by the ton of 2240 pounds. Cauldrons, sugar pans, counter scales, copying presses, furnaces, coffee roasters, sinks, lamp posts, street lamps, etc., are all made here of cast-iron; so also are corn and cob and meal mills, and lever mills, chiefly used in the South. The total production in this line by this house amounts to over 400,000 pieces per annum. The iron used in this foundry is formed of a combination of two or more kinds of pig-iron, from which they make a superior working metal for casting. The quantity of iron used in a year at these works is about 4000 tons, representing a value of over $100,000. The pig-iron is re-melted in cupola furnaces, of which there are two in the foundry. By this means both descriptions of iron are thoroughly mixed, and the mixture produces a better casting iron. The basis of the flux which is used for this purpose is lime. The stove department of the works is also extensive. They turn out stoves, heaters and ranges of all patterns and sizes. They employ six pattern makers constantly, and thus secure novelty and variety. The wood stoves are sent to the South, and the coal stoves to the east and north. In this department the firm use the same iron employed for their hollow ware. Their patent "Sunnyside Fireplace Heater" has been before the community for several years, and is very popular. In this branch of manufactures especially, Philadelphia, by reason of her proximity to the ore beds, has peculiar advantages, and produces the iron best adapted for this purpose. The works of this firm are among the largest in the State. They embrace a space of 300 by 200 feet. They have two acres of slate roofing. The moulding floor alone is a square containing 30,000 square feet. The number of hands employed all the year round is about 300. In 1869, the firm erected a new building for their offices and warerooms of the extent of 100 by 50 feet, and five stories high. The names of the partners are David Stuart and Richard Peterson. Both of these gentlemen possess a thoroughly practical knowledge of their especial line of business, and marked executive qualities.

ALEXANDER YOUNG'S DISTILLERY, 408 and 410 South street, Philadelphia. This business was founded, in 1823, by the present proprietor, who associated with him John Maitland, in the distilling of whiskey from pure rye grain. The premises then and still occupied for this purpose had been purchased by the latter for the sum of $20,000, and was known at that day as the old "South Street Theatre." It was fitted up with all the appurtenances necessary to carry on the business. This firm of Maitland & Young were the first to discover the process by which a large increase of spirit could be obtained from the grain, they having produced fourteen quarts of the former from fifty-six pounds of the latter. The articles they manufactured were a pure and excellent description of malt whiskey, and is the specialty of the works, which to this day retains its celebrity, being known by the familiar trade mark of "Y. P. M. Whiskey;" and at one time New England rum was obtained from molasses. The firm were constantly making discoveries and improvements in the modes of distillation, which has laid the foundation of the wealth and enterprise of the present establishment. This business relation, however, lasted but for two years, when Mr. Maitland withdrew from the firm, the concern being continued by the remaining partner until 1837, when William J. Maitland, son of the former co-proprietor, became interested in the distillery, and the business was now carried on under the style of Young & Maitland. This firm operated the works until 1847, when it was terminated by the death of the junior partner. Although successful, the business had not yielded enough to make the deceased partner a wealthy man. The survivor purchased the entire establishment for $20,000, being the same amount which his first partner had invested in the enterprise. Ten years later the latter also died, but he had then no interest whatever in the business. As soon as the establishment came entirely under the control of the present proprietor, he at once commenced to enlarge and improve it, expending, in the course of a few years, the sum of $60,000 on the buildings and machinery, and adding every improvement and extension that could augment the value of the concern or increase the facilities. The materials used in the production of this whiskey are pure, sound grain, the best rye, barley, corn and wheat to be had in the market being purchased; all inferior, unsound and unripe cereals are rejected. The purchases of material and sales of productions are solely for cash, this being deemed the only true mode of carrying on a safe business. The business is carried on carefully, and in the process the finest quality of hops and the purest water only are used. In order to obtain the latter desirable element, an artesian well has been sunk on the premises, which yields seventy gallons of the purest water per minute. The average capacity of the works is 350,000 gallons of spirit per annum. On September 1st, 1862, when the government first commenced taxing spirituous and malt liquors, his stock on hand amounted to 5000 barrels, valued at $200,000; and as this is about the average quantity lying in store, and as the article has since advanced in value over one hundred per cent., the calculating mind will readily figure up the value of the stock. Much of the whiskey is kept for many years, but while it gains largely in quality, the loss from evaporation is heavy. The article is never sold until it is at least three years old, that period being required to mellow it. The stock on hand at the present period (May, 1875) is 10,000 barrels of different ages. Several of the proprietor's children have an interest in the business.

ALEXANDER YOUNG was born, August 26th, 1798, in the county of Donegal, Ireland. He landed in America July 15th, 1821, having emigrated to the United States with the intention of carving his way to fortune, being possessed of the three requisites necessary to the attainment of that end—industry, energy, and perseverance. Having some knowledge of malt distilling, and desirous of perfecting himself in the production of spirit from the raw grain, he applied for admission into J. W. Dover's distillery, situated on the Schuylkill river, between Race and Vine streets, and paid a bonus of fifty dollars, together with his services for many months. Being possessed of keen observation, combined with a determined purpose, the young emigrant soon obtained a thorough knowledge of all the details of the business, and decided to try his own fortune as a distiller. After having labored in a subordinate position for a year, he had saved enough to purchase a small still, and commenced business on his own account, and with the result as already stated. He is yet as energetic and industrious as when, over half a century ago, he embarked in his calling. He is unassuming in manner and appearance, and those unacquainted with him would scarcely believe him to be the founder of so great an establishment, or the possessor of the large fortune which is the fruit of his industry. His own energy and assiduity has carried him forward in the country of his adoption to wealth and position, while his incorruptible honesty

and simplicity of manner have made him respected by the community in which he resides.

SAUSSER, DANGLER & CO., Manufacturers of Women's, Misses', and Children's Fine Shoes, Nos. 412 to 420 South Thirteenth street, Philadelphia. This house commenced business at No. 417 Arch street, in 1865, under the style of Sausser, Wagner & Co., and, from the beginning of their operations, took a leading position among manufacturers. In 1871, D. A. Dangler, of Cleveland, Ohio, a gentleman of well-known ability and business experience, purchased the interest of the junior partner, and the firm-name was changed to the present style. With the advent of the new partner into the concern, the business rapidly increased, and it was soon discovered that, in order to meet the demands of their customers, increased accommodations were necessary. The firm purchased the large five story brick factory they now occupy—105 by 90 feet—embracing the Nos. 412 to 420 South Thirteenth street, Philadelphia, to which they have since added a four story building 40 by 60 feet, the whole forming probably the largest and most complete establishment for the manufacture of this description of fine goods in the United States. They are constantly improving the quality and style of the shoes manufactured by them; using nothing but the very best material, and selecting their workmen with special reference to making the finest and most desirable goods for the retail trade, and thus command, at the present time, more skilled workmen than any two similar establishments in the country. They manufacture a full line of fractional sizes—one-quarter, one-eighth, etc.—and produce during the season an average of 2000 pairs of shoes per diem; requiring for this purpose over 500 hands. Eight travelling agents are kept constantly employed displaying samples and taking orders throughout the Union, and the result of the combined labor of the entire establishment is a business of over $1,000,000 yearly of their own production. Though the prices of their shoes usually range from two to five dollars per pair, they frequently receive special orders for articles of more elaborate workmanship. The familiarity of the members of the firm with every detail in the process of manufacture, their excellent judgment in purchasing stock, and their long experience in the business, have given them advantages possessed by very few establishments in the country.

SPRING MILL AND WILLIAM PENN FURNACES, D. O. & H. S. Hitner, Proprietors. These furnaces are located in the borough of Conshohocken, Montgomery county, and are three in number. The Spring Mill Furnace was built in 1844, and the others more recently. The stacks are 37, 40, and 53 feet in height, and the boshes are 12 and 14 feet in diameter. The ores used are the hematites. The average annual capacity of the three furnaces is estimated at 19,000 tons of pig-iron. The product in 1872 was 15,505 tons.

ASA PACKER, Coal Operator, Railroad Builder, and Philanthropist, was born, December 20th, 1805, in Groton, New London county, Connecticut, and was left an orphan at an early age. He never was able to avail himself of the ample means of education afforded the boys of that section, even at that early day, but was brought up to a life of labor: the total amount of schooling was less than a year's duration. He was, however, possessed of an active and inquiring mind, and by his own individual efforts educated himself. To seek a wider field he left home at the age of seventeen, and shouldering his knapsack, containing all he possessed, travelled westward until he reached Brooklyn, Susquehanna county, Pennsylvania, where he obtained employment with a carpenter, learned the trade, and soon afterwards went to Springville to build a house for William Dimber. Forests were being cleared and small houses erected, and he soon built one for himself, and married Sarah Blackslee. She spun and made all the garments he wore, while he worked faithfully and steadily, and with his earnings purchased lands on the upper Susquehanna, which laid the foundation of his great wealth. In 1833, he removed to Mauch Chunk. The Lehigh Canal had then been completed some years, and coal was being shipped from that point both to New York and Philadelphia. White & Hazard, of Philadelphia, were just moving for a development of its resources, when Asa Packer came upon the scene, an unknown laborer with teeming brain and tireless arm. His mind at once grasped the capacities of the country, and he devised a scheme for its development. Without money or reputation he set about his herculean task, working at his trade during the winter, and when the summer opened he was captain of his own boat, plying on the canal between Mauch Chunk and Philadelphia. His

energy attracted the attention and encouragement of the managers of the company, and he rapidly increased the number of his boats. In company with his brother, Robert W., he went into a merchandise business at Mauch Chunk, the firm-name being A. & R. W. Packer. But his activity led him to seek a wider field of operations. He built dams and locks, leased the Room Run mines at Nesquehoning, bought coal lands, operated his own collieries, and was among the first to overcome the difficulties and open a coal trade between Schuylkill county and New York. Although he had achieved prosperity and done much to develop the region, he was not yet satisfied. He early conceived the project of building a line of railway along the line of the canal, and even proposed it to the Lehigh Navigation Company, who declined to entertain the idea, believing that its revenue would not be sufficient to maintain it. He, however, thought otherwise, and determined to build it. A charter had been granted by the Legislature, in 1846, to the Delaware, Lehigh, Schuylkill & Susquehanna Railroad Company, with the usual condition that it should be void unless the road were commenced within five years. In 1850, the first survey was made, and the charter was about to expire by limitation, when, in the April of that year, Asa Packer was made a manager, and he succeeded in having a mile of the proposed line completed seventeen days before the date of its expiration. In October following he held a controlling interest in its stock; and he now proposed to build the line from Easton to Mauch Chunk, he to receive in payment only stock and bonds. In November, 1852, the work was under headway, and having determined to confine his operations to the Lehigh region alone, the other valleys mentioned in the charter were abandoned, and the Legislature amended the same by changing its title to the Lehigh Valley Railroad. He had thus incurred a great responsibility in its construction, and was beset with obstacles. Among these, the cholera, in 1854, tended to make labor scarce and wages high. The road, however, was completed and delivered to the company, September 4th, 1855. He was materially assisted in this difficult task by the New Jersey Central Railway and Commodore Stockton, who was so thoroughly identified with railroads in New Jersey. He had, previous to this aid being extended, offered the control of the line to the Lehigh Coal & Navigation Company; but they were slow to accept, and while considering his offer he had obtained the necessary assistance from those who recognized it as to their best interests to maintain a separation between the two improvements. Within two years after the line went into operation, the coal passing over the road reached half a million tons; and within the next period of sixteen months it had increased to two and a half millions. The direct results of the line, however, were small as compared with the indirect. Shops, factories, furnaces, and towns sprang into existence along the line like magic, and a steady tide of operatives came flowing in to aid in disemboweling the earth of her treasures. To his suggestion and efforts was mainly due the extension of a line of railroad through the Susquehanna valley, the great table lands of New York State, and connecting with the New York & Erie Railroad. Thus it will be seen, that although not strictly speaking a manufacturer, he has aided very materially in the establishment of many industries which have followed in the wake of his vast system of improvements in the Lehigh Valley, and in developing the resources with which that section of country abounds. In political faith he is a Democrat, and has served in the Legislature for several terms. In 1843, he was elected Judge of the County Court, which office he held for five years. He also was a Representative in Congress from his district for two successive terms. In 1868, he was the Democratic nominee for Governor, but the State being intensely Republican, he failed in the election. He is a zealous churchman in religious belief. On his return from Europe, in 1865, he founded the Lehigh University, at Bethlehem, south, endowing it with $500,000. It was opened September 1st, 1866, and since that date has, through his repeated munificence, been able to offer free tuition to those willing to avail themselves of its teachings.

BETHLEHEM IRON COMPANY'S WORKS, Bethlehem, south, Northampton county. In the month of March, 1857, Augustus Wolle, senior of the firm of A. Wolle & Co., merchants of Bethlehem, conceived the idea of enlarging the business operations of his native place. The mineral wealth of the region was being rapidly developed, and it was in close proximity to many great highways of travel. He proposed the erection of works for the production and manufacture of iron. The proposition meeting with favor—for he was widely known as a progressive man and successful speculator—he soon after (April 8th, 1857) procured a charter for the Saucon Iron Company. In the summer and autumn the originators were engaged in soliciting subscriptions to the stock of the com-

pany and in exploring the neighborhood for ore, in both of which preliminary steps encouraging progress was made. A financial crisis, involving the business of the whole country, followed, paralyzing the infant enterprise, and further operations were indefinitely postponed. Up to this time it had been fostered mainly by Augustus Wolle and his partners, Charles W. Rauch and Charles Brodhead, all leading and progressive citizens of old Bethlehem proper, and remained an unorganized body. Two years of apparent inactivity followed; but this postponement proved of invaluable benefit to the enterprise, as numerous applications for the construction and management of the proposed works came in from various quarters. Thus a fine opportunity was afforded the company for canvassing the qualifications of the various applicants. Charles B. Daniel of Bethlehem, and Robert Heysham Sayre, of the Lehigh Valley Railroad, became associated with the enterprise, and the corporate title of the company having been changed at the suggestion of Charles Brodhead (he taking the ground that a rolling mill would furnish occupation for more labor than a blast furnace) by an Act of Legislature, dated March 31st, 1857, into that of the "Bethlehem Rolling Mills and Iron Company," it was now vigorously prosecuted, and an important step towards its permanent success was taken in securing the services of John Fritz, of Johnstown, Cambria county, a master in his profession, to superintend the construction of the works, and then the production and manufacture of the metal. Augustus Wolle and one or two others were bent upon securing the services of John Fritz, and offered him rare inducements to come to Bethlehem. The healthfulness of the valley, and not pecuniary gain, however, induced him to undertake the responsibility of the task. He stands to-day as great in the peaceful arts of manufacture as any general who ever marshalled his forces in the din of battle. June 14th, 1866, the new company organized its first board of officers as follows: President, Alfred Hunt; Directors, Augustus Wolle, Bethlehem; Asa Packer, Mauch Chunk; John Taylor Johnston, of the New Jersey Central Railroad; John Knecht, Shimersville; Edward Roberts, Philadelphia; Charles B. Daniel, Bethlehem; Charles W. Rauch, Bethlehem; Secretary and Treasurer, Charles B. Daniel. On the 16th of July ground was broken for a furnace (now known as Furnace No. 1) on a tract of eleven acres of ground, lying between the track of the Lehigh Valley Railroad and the old Hellertown road, it having been purchased of Abbott, Cartright & Co., at $300 per acre. The company at the same time purchased of A. Wolle & Co. six acres of land situate between the aforesaid road and the Lehigh river, at the rate of $150 per acre. Work at the furnace was progressing slowly, when, in the spring of 1861, the country was on the eve of a civil war. This was a critical hour in the history of the enterprise. Six months of inactivity followed; but the enterprise of Augustus Wolle and Charles W. Rauch saved it from entire suspension, for a time, at least. An Act of Assembly, dated May 1st, 1861, changed the corporate title into that of the "Bethlehem Iron Company." In the fall of 1862, work was resumed with vigor. The stack, 63 feet high, with a bosh of 15 feet, was completed by the close of the year, and on Sunday, January 4th, 1863, Jedediah Weiss, of Bethlehem, fired the blast, and Kate Powell, of Philadelphia, put on the blast. The first iron made (it was smelted from a mixture of brown hematite from the Saucon valley, and magnetic oxide, from Morris county, New Jersey) was drawn January 6th, 1863. This furnace continued in blast for nearly nine months, and was then blown out for repairs. Being put in blast a second time, it continued in that condition for 363 successive weeks, producing in that time 63,067 tons of pig metal—a record which is perhaps without parallel in the annals of metallurgy. A rolling mill had been in course of construction since early in 1861. The first iron was puddled July 27th, 1863, and the first rails were rolled September 26th of the same year. This mill contains 4 engines, 14 puddling furnaces, 9 heating furnaces, and 3 trains of rolls, viz.: one 21-inch rail train, one 12-inch mail train, and one 21-inch puddle train. The capacity of these works at present is from 20,000 to 22,000 tons of railroad iron. The first heavy contract for rails was one of 2000 tons, made with the New Jersey Central Railroad in 1864; said amount of rails being furnished at $62.50 per ton; one-half, however, being delivered when the market ruled at $100 to $125 per ton. The construction of Furnace No. 2 was commenced in May, 1864. The first blast was blown March 27th, 1867, and the first iron drawn March 30th. In September of the following year the company succeeded in merging into its own the interests of the Northampton Company, an adjacent enterprise, whose works were then in course of construction. Thus the former strengthened its own position, and acquired upwards of eighty acres of valuable real estate adjoining its own property, and also leases of iron beds at different points, held by the latter. Furnace No. 3 (14 feet boshes, 50 feet high) was until this time called the Northampton Furnace, and was put in blast in December, 1868. On December 18th, 1868, the first

iron was drawn. The combined capacity of these three furnaces is about 30,000 tons of pig-metal per annum, most of which is manufactured in the company's rolling mill. At a meeting of the stockholders, held July 28th, 1868, it was resolved to approve of the late suggestion of the Board of Directors to engage in the manufacture of steel rails, and that "the Superintendent take measures to construct works suitable for the manufacture of such rails without delay." Action on this resolution was at once taken, and, in September following, the construction of the Cyclopean Mills was commenced. A machine shop (dimensions 234 by 64 feet), built in 1865, and furnished with the most approved appliances, and a foundry (dimensions 107 by 64 feet), built in 1868, enable the company to build or make the engines, pumps, rolls, or whatever is requisite for the complete equipment of any portion of their enterprise, and also to keep their extensive works in repair. Rolling Mill No. 2 of the Bethlehem Iron Company, built in the shape of a Greek cross, has an extreme length of 931 feet, and covers an area of 164,391 square feet—*i. e.*, upwards of 4.6 acres of ground. This colossal structure is covered with a slate roof (slate from the Chapman quarry), resting upon grooves of cast-iron, without supporters, presenting in the interior an elegance of design and construction quite singular. The 24 and 26 inch rail train is 124 feet 9 inches in length from centre to centre of engines, with engines at each end (one with 48 inch diameter of cylinder, 46 inch stroke; the other 56 inch diameter of cylinder, 48 inch stroke), and is the largest continuous rail train in the world. The 31 inch blooming train is run by an engine with 36 inch diameter of cylinder and 60 inch stroke. The probabilities are that additional trains of rolls—to wit: one 9 inch, one 14 inch, and one 18 inch—will be added. The mill contains four sets of saws, with double engine for each set, a double blowing engine for the Bessemer works, two five ton Bessemer converters, with a capacity of 200 tons of steel per 24 hours, a cupola engine, and seven Siemen's regenerative gas furnaces for heating purposes. The Bethlehem works consume annually 70,000 tons of Pennsylvania hematite and New Jersey magnetic oxide, and from 90,000 to 100,000 tons of coal. Fully 1400 men are employed in this great enterprise. Two new blast furnaces—each 80 feet high by 20 feet width of boshes—are now (May, 1875) in course of erection, and will be completed during the coming summer. These will add 50,000 tons of pig-iron to the annual production of the works, and involve a further consumption of from 70,000 to 80,000 tons of coal.

PASCAL IRON WORKS, Morris, Tasker & Co., Philadelphia. This establishment owes its origin to Stephen P. Morris, who, in 1821, commenced, in Philadelphia, the manufacture of stoves and grates. In 1835, he associated with him, in the same business, Henry Morris and Thomas T. Tasker, Sr., their location being then at Third and Walnut streets, where they remained for many years. In the same year illuminating gas was introduced in Philadelphia, and the firm began the manufacture of gas pipe under the superintendence of William Griffiths, an English pipe maker then just arrived. At that time gas pipe was almost entirely hand-made, the threads for coupling the pipes being cut by a hand die turned by manual labor. To supply the demand for the newly introduced gas pipe, which should be made by machinery, the firm, in 1836, began the nucleus of the present Pascal Works, which now include an area of eight acres, covering nearly three entire squares in the southern portion of the city. The manufacture of gas pipe soon demanded the addition of that of gas fittings and gas fitters' tools, and there naturally followed also the construction of gas generating machinery and the whole plant for city gas works. To this was added by degrees the production of pipes and tubes for analogous purposes, water and steam tubes, steam boilers, steam and water heating apparatus and the tools necessary in erecting the same. They manufacture locomotive flues from two to eight inches in diameter, and from ten to twenty feet long, all lap welded. Thus, from the small beginning noted, these works now manufacture every variety of apparatus for lighting, heating, ventilating, or supplying with water any building. The plant of this establishment includes seven steam engines and twelve boilers, with an aggregate of 1000 horse power; also, pipe and heating furnaces, lathes, planers, screw-cutting machines, drill presses, boring, tap-cutting, grinding, shaping, and polishing machines. No shafting is to be seen in the tube works, the entire line being placed beneath the floor, thus saving space and adding to the convenience of the workmen. All the machinery is in duplicate, to prevent possibility of delay by breakage of any portion. The newer buildings are strictly fire-proof, while the main building can be, by an arrangement of pipes, flooded with steam in case of fire. Nearly 1600 hands are employed, and 25,000 tons of iron and over 150,000 tons of coal are annually consumed. In the construction of hot-water and steam heating apparatus the establishment has long been famous. One of the variety of hot-water furnaces designed

by Thomas T. Tasker has received most flattering commendation from the Committee of Science and Arts of the Franklin Institute. In the production of the various specialties of gas-generating machinery, the firm possess the exclusive control of the manufacture of the improved form of valves designed by P. Munzinger—who has for years been connected with the works—which designs have had almost universal introduction into gas works on account of various advantages. In June, 1873, the firm first offered to the public the vulcanized rubber-coated iron tube. This is manufactured under the Finley patent, and had been thoroughly tested for two years previous to its introduction. It is believed to be far superior for the passage of natural waters, either hot or cold, to galvanized iron or lead tubes. It will bear a degree of heat above 300 degrees, water having been boiled in it for several hours. Owing to the growth of their business, and difficulty in obtaining proper railway connections in Philadelphia, the firm purchased, in January, 1873, a tract of 1600 acres of land adjoining the town of New Castle, Delaware, and with a river frontage of over one mile, for the erection of additional works, to be called the Tasker Iron Works.

PENN STOVE WORKS AND HOLLOW WARE FOUNDRY, Cox, Whiteman & Cox, Proprietors, Philadelphia. This house has been established more than twenty years. The works are located at American and Dauphin streets, on a lot of ground extending 122 by 446 feet. The buildings are of brick and are very extensive. The moulding room is 75 feet wide and 165 feet long. The mounting shop is 122 feet long, 36 feet wide, and five stories high. The pattern storeroom is 36 by 77 feet and three stories high, and the other departments are all proportionately large. The number of hands employed is about 100. The quantity of iron yearly made into stoves amounts to 1500 tons. The stoves manufactured by the firm amount to 25,000 of all kinds yearly, and are chiefly cooking stoves, but they also make a great number of heating and parlor stoves in every variety of style and pattern. To several of these they have adapted the iron cylinder, though they also furnish the clay cylinder. Their "Superb" cooking stove, which they first produced in 1871, is a perfect specimen of skill and excellence in the manufacture of stoves; having all the improvements of the best stoves of this description, together with enlarged capacity, new ash-receiver, tin-lined doors, and non-conducting door handles. The house is one of the largest stove makers in the country. The store and warerooms are situated at 106 North Second street. The building is four stories high, 20 feet wide and 115 long. The first floor is used as a salesroom and for offices, while in the upper part of the building a number of hands are engaged in the manufacture of tin-ware, both for general sale and for the fitting of the stoves.

CORNELIUS & SONS, Manufacturers of Lamps, Chandeliers, and Gas Fixtures, Philadelphia. This is the pioneer establishment in the manufacture of lamps and chandeliers, and the parent of other promising concerns that are working for the same end. It was founded over forty years ago, and was then but a small workshop, employing two or three journeymen. Now it is an immense factory, located on Cherry street west of Eighth, five stories high, built in the form of a hollow square, and is entirely fire-proof. The floors are of brick, the stairs and window sashes of iron, while the roof is of both slate and iron. Each distinct process has its room or department, and every grade of workmen, from the common laborer to the skilful artist or chemist, is needed in the various divisions; indeed, almost every nationality of the civilized world is here represented. As the work is usually made in numerous parts, the fitting of these constitutes an important branch in such an extensive establishment. One room is occupied entirely by a number of men who are constantly employed in fitting together such gas work as chandeliers, pendants, brackets, etc; and in a second, the numerous class of solar lamps designed for standing on the table, or suspended from the ceiling, or adjusted to the wall. From all these rooms the goods are taken to the packing department, whence they are shipped to all parts of the Union, to Cuba, South America, Canada, China, and India. Besides these rooms in which these processes are conducted, there are numerous others devoted to special purposes. Some of the ornamental work is painted in parti-colors to please fanciful tastes; some are bronzed, while others are enamelled or covered with a coating of fine gold. There are also apartments for the workers in artistic bronze, while others again are used for work in which the chief agents are lacquer and acids. In the prosecution of such an immense business there is a vast deal of turning of metals. Many hands are employed in cutting screws, a branch requiring great care and skill. All the screws of the different classes are

made of one size; so that if the branch of a chandelier exported by this house to China should find its way to Russia, it would fit exactly into any of the chandeliers exported there. The success which has attended the operations of the firm is especially due to the constant attention paid by the managing partners to the scientific principles of metallurgy, chemistry, and mechanism. Among the many masterpieces which have been produced in the establishment may be named the apparatus which lights the hall of the House of Representatives at Washington, and also that of the Senate Chamber, which contain 2500 burners, but so arranged that all can be lighted instantaneously. The chandeliers and brackets of the capitol at Columbus, Ohio, contain among their embellishments statuettes of Prudence, Science, Commerce, Liberty, America, all modelled and bronzed in the highest style of art. The chandelier of the Hall of Representatives, at Nashville, Tennessee, decorated with the products of the State—corn, cotton, tobacco plants; the chandeliers and gas fixtures in the Academies of Music in Philadelphia, Boston, and Brooklyn were also made here. The chandeliers hanging in the auditoria of the two first mentioned are 16 feet in diameter and 25 feet long, containing 240 burners. The firm of Cornelius & Baker was dissolved in 1869. The present firm is composed of Robert, Robert C., John C., and Charles E. Cornelius, and Charles Blakiston, Jr., under the firm-name of Cornelius & Sons, who have their warehouse and salesroom at No. 1332 Chestnut street. They have just finished the fitting of the new City Hall in Baltimore, having made the entire gas fixtures for the building.

PHŒNIXVILLE BRIDGE WORKS, Clarke, Reeves & Co., Proprietors. Office 410 Walnut street, Philadelphia. This firm are builders of iron bridges, viaducts, roofs, iron tables, etc., and the works have a great advantage in being connected with the Phœnix Iron Company, where the iron used in construction is made. Some of the most extensive iron structures in the country have come from this establishment, among which are the International Bridge at Black Rock, New York, the New York Central & Hudson River Railroad Bridge at Albany, and the new Girard Avenue Bridge, which spans the Schuylkill river at Philadelphia; the latter being the most ornamental structure of its kind in the country, beside being—100 feet from centre of railings—the widest in the world. In the machine shop of the Phœnix Iron Company, by the application of the necessary machinery, great accuracy of work is obtained, and each part of an iron bridge can be exactly duplicated if necessary. This method of construction is entirely American, the English still building their iron bridges mostly with hand labor. Consequently American iron bridges, despite the higher price of our iron, can successfully compete in Canada with bridges of English or Belgian construction. The American iron bridges are lighter than those of other nations, but their absolute strength is as great, since the weight which is saved is all dead weight, and not necessary to the solidity of the structure. Before any practical work upon the construction of a bridge is begun, the data and specifications are given and a plan of the structure drawn. Calculations and plans are then made for the use of such dimensions of iron, that the strain upon any part of the structure shall not exceed a certain maximum—usually fixed at 10,000 pounds to the square inch. As the weight of the iron is known, and its tensile strength is estimated at 60,000 pounds per square inch, this estimate, which is technically called "a factor of safety" of six, is a very safe one. In other words, the bridge is planned and so constructed that in supporting its own weight, together with any load of locomotives or cars which can be placed upon it, it shall not be subjected to a strain over one-sixth of its estimated strength. After the plan is made, working drawings are prepared, and the process of manufacture commences. The eye-bars, when made, are tested in a machine at double the strain which by any possibility they can be put to in the bridge itself. The elasticity of the iron is such that, after being submitted to a tension of about 30,000 pounds to the square inch, it will return to its original dimensions; while it is so tough, that the bars, as large as two inches in diameter, can be bent double, when cold, without showing any signs of fracture. Having stood these tests, the parts of the bridge are considered fit to be used. When completed the parts are put together, or "assembled," as the technical term is, in order to see they are of the correct length, etc. They are then marked with letters or numbers, according to the working plan, and shipped to the spot where the bridge is to be permanently erected. The method of making all the parts of a bridge to fit exactly, and securing the ties by pins, is peculiarly American. The plan still followed in Europe is that of using rivets, which requires more time to erect the bridge. For example, a riveted lattice bridge of 160 feet span would there require ten or twelve days for its erec-

tion, while one of the Phœnixville bridges of this size has been erected in eight and a half hours.

SAMUEL R. PHILLIPS, Manufacturer of Fine Harness, No. 113 South Thirteenth street, Philadelphia. This establishment was founded, in 1833, by John Lacey, who was then located at No. 12 Fifth street, north of Chestnut, west side, where he carried on the business of manufacturing and vending fine harness. He died in 1835, and was succeeded by his brother, William Lacey, who continued the enterprise. In the same year, the present proprietor entered the factory as a sturdy, active boy, who was destined, in after years, to bring the manufacture of fine harness to the highest degree of perfection. The business of the concern grew as years rolled on, and, in 1845, S. R. Phillips had become a harness maker of unusual skill, and endowed with rare business capacity. He was tendered a position as junior partner, and the new firm of Lacy & Phillips achieved the first triumphs ever attained by Americans in this trade, having received the gold medal in the World's Fair at London, in 1851, for the most durable and best finished set of double harness. This was valued, twenty-four years ago, when labor and materials were much cheaper than at present, at $4300, but could not be duplicated at this time (1875) for less than $10,000. They continued at the old stand until its destruction by fire, in 1854, when at the close of that year the structure known as Fotterall's buildings was entirely destroyed by fire. They found temporary accommodation at the corner of Fifth and Minor streets, and, while sojourning there, erected for themselves the tall brick buildings Nos. 30 and 32 South Seventh street, to which, on completion, they removed. They continued here for many years, also establishing and conducting a branch store in New Orleans, which remained in active operation until the outbreak of the Rebellion. In 1855, the senior partner died, and his interest was purchased by the surviving member, who thus became sole proprietor. In 1868, the business was removed to one of the splendid marble stores erected on the site of the Maschert mansion, on Chestnut above Twelfth street. In 1875, another removal was made to the present stand. In the production of fine harness, Samuel R. Phillips ascribes the high position he has achieved chiefly to systematic division of labor. The unalterable rule of the establishment is that every journeyman shall confine his attention to a single article day after day; there is no change in the routine. Though this is monotonous for the workmen, yet it secures a high degree of perfection in the articles made. The factory is divided into five distinct departments. The draughtsman designs the pattern, which is then handed to the cutter. With the exception of patent leather, nothing but the best Pennsylvania tanned sides are used; after the strips and squares are formed under the knife, these fragments are "set up," which is the third stage. The stitcher sews these together, and, after being subjected to a close scrutiny, removing superfluities of thread and leather, smoothing down rough edges and adjusting the mountings, cleansing and polishing, the several portions are adjusted and joined—a work readily accomplished—and the garniture is ready for the horse. There are two other departments in the factory, one of which is devoted to the making of saddles, and the other to the manufacture of collars. The business is a large one, and its customers are to be found in all portions of the country.

S. A. GEORGE & CO., Printers, Electrotypers and Stereotypers, Philadelphia. This house has been in existence for years. It was first established as a stereotype foundry, in Sansom above Sixth street, by George Charles, who was succeeded, in 1860, by S. A. George, who, in the year 1864, removed from Sansom street to the southwest corner of Seventh and Cherry, adding electrotyping and printing to stereotyping. The business so increased that, in 1870, James M. Ferguson was admitted to a partnership, and before the year had closed the firm were compelled to remove to the new building at the corner of Seventh and Commerce streets, which was arranged by the owner during the progress of its erection to meet the requirements of their largely increasing business. They occupy the second floor for electrotyping and stereotyping and finishing the plates. The third story, which covers a space of 120 by 72 feet, is devoted to the composing and press rooms. The number of hands employed is about seventy-five. Fifteen presses are constantly employed, eleven of which are "Adams" presses, and four "Campbell" presses. Two of the latter are of the class known as "combination presses," for the finest kinds of cut work. They consume, in the manufacture of stereotype and electrotype plates, about one ton of metal per week. The printing department of the establishment is devoted exclusively to the printing

of fine class books, generally religious and historical works. Of Bibles alone, they produce 50,000 quarto per annum.

ALFRED WILLIAMS, Manufacturer of Fine Kid, Castor and Buckskin Gloves and Gauntlets, No. 239 North Eighth, No. 545 North Third, and No. 726 Vine streets, Philadelphia. The proprietor of these locations, and of the glove manufactory, founded the business, in 1864, at No. 346 North Second street. In January, 1869, he sold out that establishment to his father. He is descended from an old glove-making family, his father having been a cutter in the great glove manufacturing establishment of the celebrated Dent, of London, where he himself also served his time, commencing at the early age of twelve years, and remaining with that house until he quitted England for America. Subsequent to his occupancy of the Second street store, he established a retail store at 726 Vine street, and, in July, 1872, purchased the business stand of William Hawkins, at 545 North Third street. He was fortunate enough to secure the services of first-class workmen, who thoroughly understood the making of fine kid gloves. These are made altogether by hand, and are, in appearance and wear, fully equal to the imported article. Nothing but the very best material is used; the skins, principally imported, are first dampened, and then stretched to their fullest extent lengthwise, being afterwards cut into strips of about eleven inches long, or shorter, according to the size of the glove to be made. These lengths are next widened crosswise, and cut into "tranks," and in this way the exact size of the glove is obtained. The cutters then "pull them down" or "try them out" into glove form, just the length and width they will be after they are finished. The thumbs and fourchette, or fork, to go between the fingers, are cut first, after which three or four pairs are put under the knife, which is the exact shape of the fingers, and the whole placed under a press and cut. After this they go to the sewing machine—the Howe being used—and receive the raised stitch on the back, known as *point de Paris* stitch, and are next sewed with a lap, or double seam, which finishes the outside of the glove, improves the appearance, and makes it more durable. After receiving the final touches, lining, pressing, etc., they are ready for the market. The proprietor makes a specialty of forming what are known as "Williams' Self-fastening Gloves," with a spring at the wrist, which is secured against breaking through the leather by "Oliphant's Patent Metal Retainer," placed on the end of the spring over the leather, thus preventing its cutting through. These gloves are made here in large quantities, of the best imported dog-skin, and have become very popular on account of their durability and beauty, and are of various styles and finish. They are lined either with imported plush, lamb's wool, felt, or lamb's skin, and are tipped with beaver or otter fur around the wrist. Every desirable style of glove is made in this establishment, the list extending to some sixty different varieties, ranging from the finest kid to the heavy buckskin glove, sewed with waxed thread and double seams. About fifty hands are employed during the busy season, the greater portion taking the work home with them to sew by hand, while the machine work is all performed at the factory. So great has the demand become, that his orders are constantly ahead, although his employees have been working on extra time. The success which has attended the business since its inception is due to the fact that the proprietor has striven to surpass all competitors in his line, that he gives his personal inspection to all the work, besides being thoroughly familiar with its every detail.

HAGY & KNOWLES, Manufacturers of, and Dealers in Railroad Supplies, Office, No. 7 Walnut street, Philadelphia. The business of this house was founded about eight years ago under the present management, and is one of the most prominent firms engaged in this description of enterprise. There are several departments in which the business is divided; but they make a specialty of cotton and woollen waste and railroad lumber, embracing bridge timber, piles, railroad ties, car lumber, etc. The cotton waste is used for cleaning machinery and packing, while the woollen waste is only for packing. Very large quantities of these materials are used to keep the locomotives and other machinery in the admirable order they are seen to be, and to keep the axles of the cars properly lubricated with the saturated woollen waste. The firm dispose of this article only by the bale, which average 450 pounds each. There are different varieties of the article; some of it is "unmachined" cap waste, obtained from cotton mills, but a large portion of it is prepared for use by special machines. There is probably no railroad in the country but has received some of their goods. Their establishment is at No. 7 Walnut

street, under the charge of a competent foreman. The lumber branch of this business is likewise of large dimensions. During 1873 they shipped 400 vessel loads of timber, chiefly from the South. The white oak is procured in Delaware, Maryland, and Virginia; the cedar and cypress, chiefly in North Carolina, and the hacmatak principally from British Provinces and Maine. This timber is sold mostly in the rough, and is sent wherever vessels can go. The firm send men into the woods, under the direction of superintendents, and cut their own timber, when sub-contractors are likely to be short, and can fill orders of any size promptly on demand. Not long since, they received a contract for 5000 piles, 80 feet long, from New York. To facilitate business, they have a private telegraphic cipher code for their own use and for that of their customers. A few figures may help to explain the great demand for railroad lumber. It requires from 2500 to 3000 ties for each mile of single track road; the full average life of a tie is about seven years; consequently, the consumption of ties for repairs is about 350 per mile yearly. Every tie averages about 40 feet, board measure, and is valued at $25 per 1000 feet. With the present length of roads—nearly 90,000 miles—in this country, the sum expended annually for ties is over $35,000,000—including other lumber used this amount would be doubled. Thus it will be seen that in the consumption of ties alone on the roads now built, there must be a very large demand to be supplied. From this brief outline of a leading house, some idea may be formed of the energy, enterprise, and capital required to carry on the business; and their operations have proved eminently successful. By their straightforward dealings and prompt execution of orders, large and small, they have won a high reputation in the commercial community. They do not exclusively sell to railroad men, but are general dealers.

ALLENTOWN IRON COMPANY, Joseph Cabot, President; P. S. Hutchinson, Vice-President; H. Cabot, Secretary. Office 230 South Third Street, Philadelphia. The furnaces belonging to this company are located at Allentown, the shire town of Lehigh county, Pennsylvania, and are five in number. The first was erected in 1846, and the last in 1872. The heights of the stacks are 45, 52, and 60 feet, and the diameter of the boshes 12, 14 and 16 feet. The ores smelted at these works are the hematite and magnetic. The average annual capacity of the five furnaces is estimated at 36,000 tons; the product, in 1872, being 32,714 tons. Joseph Cabot was the first, and has been the only, President of the company.

PENNSYLVANIA MILLS, operated by Allen & Morris, form a portion of the same building as the Blantyre Mills, of Manayunk, owned and operated by Sevill Schofield. The mills were erected by J. C. Kempton, about 1847, and wholly operated by him as a cotton mill until 1851, when he leased the lower stories to A. Campbell & Co. They were operated in that manner until partially destroyed by fire, about 1854, and after being rebuilt by Kempton, were operated by A. Campbell & Co. until March, 1869, when Edward Holt commenced the manufacture of doe-skins and hosiery and continued till his death, in November, 1872, after which it was operated for the estate by Henry F. Morris, until the stock on hand was consumed. The property had been purchased by Sevill Schofield, who is still the owner, about 1864, and the machinery belonging to the estate of Edward Holt having been sold at public sale, February 5th, 1873, was purchased by William Allen and Henry F. Morris, doing business as Allen & Morris, who started the mill February 17th following, and still continued. The part of the mill occupied is about 80 by 40 feet, four stories in height, as well as a two-story picker house, 80 by 43 feet, and one-story dye house, 25 by 100 feet. They consume weekly about 6000 pounds of stock, running three sets of woollen machinery, fifty-four looms with necessary side machinery, employing about fifty-four hands, and producing about 7000 yards per week of doe-skins and jeans. They consume all their own yarns and convert raw material into finished goods. The motive power is derived from a 150 horse engine, which also operates the Blantyre Mills.

WILLIAM ALLEN was born in Manchester, England, June 16th, 1824. Having left school at nine years of age, he became an apprentice to the cabinet-maker's trade in Manchester, where he served seven years. He subsequently became foreman for his preceptor and employer, and so continued until he came to the United States, in 1848. He worked as a journeyman cabinet-maker in Philadelphia until 1850, when he went as a machine carpenter and pattern-maker to J. C. Kempton, and so continued until about 1851, when he engaged as foreman for A. Campbell & Co., and so

continued until he entered into business on his own account, in 1858. He, at that time, associated with Saxon E. Warren as Saxon E. Warren & Co., and the new firm engaged in the manufacture of cotton goods, which they continued till the outbreak of the war, when the firm was dissolved. After superintending various mills, he became foreman for Sevill Schofield, and so continued until 1869, when he engaged in business for himself as Allen & Son, in the Standard Mills, Kensington, Philadelphia, where he was occupied in the manufacture of yarns. The mills having been destroyed by fire, December 23d, 1872, he removed to Manayunk, and shortly after entered upon the present enterprise. Being active and public-spirited, he is ever found ready to promote public enterprises. He has been a Director of the National Security Bank since 1871.

HENRY F. MORRIS was born in Bolton, Lancashire, England, December 13th, 1832, and having accompanied his parents to the United States, in 1842, settled in Manayunk, where he entered Kempton's Mill, now occupied by Heft & Ogle, at the age of twelve years. He remained there with slight interruptions until he was seventeen, when he was apprenticed to an optician and silversmith, in Philadelphia. He remained with his instructor after attaining his majority, and continued as his workman until 1855, when he returned to the manufacturing at Manayunk, with Laycock & Holt, who were engaged in the hosiery business. After the death of John Laycock, in 1864, he became manager for Edward Holt, and so continued until he formed the present co-partnership. He has won his own success, and is, in common with his partner, a representative of the class who rise by the force of their own will, and ever befriend the laboring classes.

LOISEAU PRESSED FUEL COMPANY, Manufacturers of Artificial Fuel from Coal Waste, Philadelphia. This company was incorporated in November, 1874; the officers being Hon. John Leisenring, President; Fisher Hazard, Secretary and Treasurer; General Superintendent, Emile François Loiseau, the inventor of the process, who is also one of the Board of Directors. The works are situated on Bath street, and occupy nearly four squares, extending 400 by 325 feet. The number of hands employed is at present (1875) about forty. The utilization of coal waste, and its conversion into a marketable fuel, is a most important industry, and has been the subject of scientific attention for years. It is a branch of manufacture as yet in its infancy, though France has twenty-eight establishments of this kind, and Belgium nine; besides several in England. In all these countries many processes for this purpose have been patented, none of which have been completely successful. It is a well-known fact that coal, either bituminous or anthracite, produces in mining, breaking, screening, and handling, a certain amount of "waste" or "slack," amounting on an average to from forty to fifty per cent. of the coal production, thus causing a considerable loss to the parties engaged in mining and to the public at the same time, as the price of the marketable coal is thereby increased. In the anthracite coal regions, this immense amount of "waste" is constantly being piled up around the mines in vast, unsightly mounds, burying the mining villages and sadly encroaching on the limits of the chief towns. The amount of this waste is estimated at not less than thirty millions of tons, and every year adds to the rapidly-increasing dirt bank. For the last thirty years, attempts have been made to convert this "waste" into "artificial fuel" by trying the different processes used in Europe for the agglomeration of bituminous and semi-bituminous coal-dust, coal-tar, pitch, rosin, asphaltum, shale-oil, silicates, etc., but have all been tried without success. Inventors forgot, or neglected, the fact that anthracite is a dry, vitreous coal, without any bitumen. Bituminous and semi-bituminous coal-dust, made into lumps by resinous cements, maintain their shape, while burning, because the fuel is *coked*, before the resinous material used as cement is consumed. The tendency of the resinous material to expand is thus counterbalanced by the coking of the coal. It is not so with anthracite. The waste of anthracite coal manufactured into artificial fuel, by using resinous cements, cannot maintain its cohesiveness, when submitted to elevated temperatures. The tar, pitch, asphalte, or rosin is consumed before the fuel has given its full heating power, and the small particles of coal having lost their adhesive coating, disintegrate, and fall through the grate bars, without being consumed. A careful analysis of the ashes will demonstrate this fact. By using silicates as cement, the coal manufactured is impervious to moisture; but, while burning, the cement fuses in the heat of the furnace, and, coating the cemented particles with a liquid glass, prevents the access of the air to it, preventing its combustion, and finally forms an objectionable clinker. Supposing that good artifi-

cial fuel could be manufactured by using resinous cements, it would be unfit for domestic purposes, on account of the smoke and of the disagreeable odor created in burning it. To obviate these difficulties and to reduce somewhat the proportion of resinous cements required to form a solid coal (cements whose high price increase considerably the cost of manufacturing), a number of inventors have added to the mixture a certain percentage of clay. Clay has a peculiarity, which is its progressive contractility when submitted to elevated temperatures. This tendency of the clay to contract counterbalanced the tendency of the resinous materials to expand, but the smoke and the bad odor produced in burning made it still unfit for domestic purpose. The manufacture of the coal was also too expensive. To consolidate coal waste by means of resinous or bituminous materials, the coal has to be washed, dried, and heated; the cement has also to be kept by heat in a soft or liquid state. The mixture is done in machinery surrounded by steam-jackets; the pressure is given while the plastic mass is hot, and when the coal is compressed, it has to be piled up in cars, with perforated sides and bottoms, and submitted to almost complete carbonization, in ovens, to remove as far as possible the obnoxious volatile matters contained in the cements. All these operations require very expensive machinery, a large consumption of coal for heating the whole machinery, and, worst of all, unnecessary handling. The result is that the fuel thus manufactured is too costly, and cannot compete in the market with the ordinary coal. The Loiseau process is a decided improvement on the process known in Europe for the last two centuries, and applied more especially to-day in Germany, in the north of France, and in Belgium. It is to use for cement common yellow clay, free from sand; but instead of mixing it with water, it is moistened with milk of lime (water in which five per cent. of lime is dissolved). The proportion of clay used in Europe is still from fifteen to twenty per cent., and the artificial fuel thus manufactured cannot be left exposed to rain, snow, or even dampness, without softening and disintegrating. By a peculiar way of mixing, the percentage of clay is reduced to five per cent., and the fuel is rendered impervious to moisture, by immersing it into a water-proofing compound (rosin or any other gum dissolved in crude benzine). The "artificial fuel" is immersed in this composition immediately after being dried, and is afterwards submitted to the action of a strong current of air, which evaporates the benzine and leaves each lump coated with a thin film of rosin, closing all the crevices. The manufacture of the fuel is carried on automatically with machinery of great simplicity. No heat is required, except for the motive power and the drying of the coal. The lumps are egg-shaped. That shape is preferable to any other, as it presents no sharp edges which, in square or cylindrical lumps, break off easily, while the coal is loaded and unloaded. The egg-shape also secures, when the fuel is burning, sufficient space between the lumps, to allow a free access to oxygen. After very careful experiments, the Committee on "Science and Arts" of the Franklin Institute of Philadelphia has made a very favorable report, which has been published in all the scientific papers and in all principal periodicals of the coal mining States. The American Institute of Mining Engineers has discussed the process at length in public meeting. It has also received the approbation and indorsement of a large number of scientific and practical men, interested in coal matters. This fuel ignites readily; it burns well and makes a regular and hot fire; it does not smoke or give out any unpleasant odor; it produces no clinkers, is free from slate, and burns completely to ashes. These ashes being mixed with the clay, which is not consumed, are very heavy, and when removed, do not rise in clouds, covering furniture with dust, as is the case with ashes of ordinary coal. The artificial fuel made by this process lasts longer than ordinary coal, and can be sold profitably much cheaper than the stove coal now sold. The details of the manufacture are as follows:—The coal-dust is dumped on a platform and pushed into the hopper of a stationary cylinder, in which revolves a shaft; to this shaft are fastened six radiating partitions which divide the interior of the cylinder into six equal spaces; the coal-dust fills these spaces, and the rotary motion given to the partitions carries it to an opening below, where it is discharged. A smaller hopper, close to the first one, receives the clay, previously dried and ground; this clay is carried through a smaller cylinder containing also revolving partitions, and is discharged in the same chute as the coal-dust with which it mingles. The space between the partitions of the clay cylinder is calculated to receive and discharge regularly five per cent. of clay; while from the larger cylinder ninety-five per cent. of coal-dust is discharged. This dividing apparatus is very simple, and mathematically correct. The mixture of coal and clay, while falling under a chain elevator, is sprinkled with milk of lime, and is raised in a moist condition, by said elevator, above the hopper of a conveyer in which it is discharged. A screw

propeller revolving in this conveyer forces the materials into a mixer, where they are rapidly worked into a plastic mass by seven upright shafts, to each one of which four teethed arms are fastened by set screws. These arms cross each other in all directions and thoroughly mix the coal and the clay. By a very ingenious and new device, the shafts can all be removed and replaced, without removing the frame in which they stand. Through suitable openings at the bottom of the mixer the plastic mass falls, along a chute in the pug mill of the compressing machine, and is forced by a series of knives and a propeller fastened to central shaft through an aperture at the bottom between two moulding rollers, having on their periphery a series of oval moulds. These rollers revolving in opposite directions, receive between them, from the pug mill above, the plastic mass in a continuous sheet and mould it into egg-shaped lumps. The lumps are discharged under the rollers on an endless wire cloth belt, to which motion is imparted by cast-iron balls, and these balls secure under the wire cloth a rope which strengthens it. The rollers, around which the wire cloth belt revolves, have concave receivers wherein the balls successively fall, thus forcing the belt to move forward and to discharge the coal into a hopper placed on top of the drying tunnel. The feeding of the plastic mass to be compressed can be regulated in three different ways: 1st, by placing the knives inside the pug mill at any required angle; 2d, by increasing or reducing at will the number of revolutions of the shaft to which the knives are fastened; and 3d, by increasing or reducing the size of the aperture at the bottom, through which the plastic mass is forced between the moulding rollers. The latter is done by dividing the bottom into two halves meeting obliquely downward, and worked separately by a worm screw or by a lever. By removing from one another the two halves of the bottom, or by bringing them nearer together, the size of the aperture between them is longitudinally increased or reduced. The drying tunnel is heated by two fire-places, one at each end. It contains five moving endless wire cloth belts placed over one another, and so disposed that the balls move in a groove under each belt, so that the coal cannot fall from them. These belts revolve in opposite directions around rollers placed at each extremity of the tunnel. The lumps of compressed coal discharged from the press carrying belt, fall in the dry-tunnel on the top belt, and are carried by it the entire length of said tunnel, when they fall on an apron which guides them to the second belt below. On this belt the coal travels again in the opposite direction the entire length of the tunnel. It is then discharged on another apron along which it slides on the third belt below, and so on from the third belt to the fourth, and from the fourth to the fifth. This last belt carries the coal out of the tunnel, and discharges it into the buckets of an elevator by which the coal is raised and discharged on the "water-proofing belt." This belt is guided by balls on each side in an open tank, on the sides of which are grooves describing a curve. This tank is kept filled with the water-proofing compound, supplied from a larger tank near by; the belt has small partitions to prevent the sudden fall of the lumps in the mixture and to rake them out of it; the balls moving in the curved grooves immerse the coal continually in the water-proofing liquid. When coming out of the bath, the liquid in excess on the coal falls in drops through the wire cloth into a gutter placed under it, and through a pipe in a suitable vessel. The water-proof compound used by E. F. Loiseau is rosin or any other gum dissolved in benzine. To evaporate rapidly this benzine, the coal coming out of the bath is discharged into the hopper of a second tunnel of smaller proportion than the drying tunnel, in which there are only three belts placed one above another. A blower forces into this tunnel a strong supply of air which evaporates the benzine, while the coal is travelling from one belt to the other. From the third and last belt the coal falls through a chute into the coal car standing outside. The end of the chute can be raised to allow time for the removal of a loaded car, and the placing under the chute of an empty one. The motion given to the coal in the tunnel brings only a few lumps in contact with one another, thus giving to all the lumps the full benefit of the heated atmosphere and drying them more rapidly. In Europe the coal is still piled up in cars with perforated sides and bottom and baked in ovens, which requires much time, unnecessary handling and consumes a large amount of fuel. From the moment that the coal-dust is pushed into the coal-hopper, the whole process of manufacturing it into artificial fuel is carried on automatically. The coal-dust and the clay are mixed in the required proportions with the milk of lime; these materials are carried, mixed, compressed into lumps, dried, made water-proof, the benzine evaporated, and the coal loaded on cars ready for market, all by machinery. During the entire process the coal is constantly in motion. The process itself, and the machinery for its application, are the invention of E. F. Loiseau.

Novelty, ingenuity, and simplicity are its characteristics. It demonstrates at once the possibility of converting, at a small expense, the anthracite coal waste into a good, marketable fuel. For more than ten years the patentee has been working out this artificial fuel problem, amidst all the trials and difficulties that beset an inventor. His process is the first one that was ever submitted to a scientific body in this country for examination. The Committee on Science and Arts of the Franklin Institute made a flattering report in its favor, after a thorough test of its merits, and at a meeting of the American Institute of Mining Engineers the invention was discussed. It has been thoroughly and practically tried, and its success is an accomplished fact. The inventor has overcome all the failings of the methods hitherto tried, which were many and radical. Thus, primarily, it is evident that no artificial fuel containing a resinous substance will ever be used for domestic purposes, on account of the smoke and of the bad odor. Another objection is that such a fuel is liable to spontaneous combustion. No objections of this kind can be raised against artificial fuel cemented with clay and milk of lime. Again, by mixing the coal-dust and the cement in a vessel which contains only one single shaft with blades, the materials are turned around always in the same direction; it takes a long time before they are brought to a plastic state. Increasing the length or the number of horizontal mixers requires too much valuable space and is very expensive. A better result would certainly be obtained if the diameter of a vertical mixer was increased, and if several upright shafts, commanding each other and consequently revolving in opposite directions, were used instead of a single one. The knives of these shafts crossing each other in all directions, would undoubtedly perform a quicker and better work than the blades of one single shaft. Practical experiments have demonstrated this fact. T. M. Mitchell, of Philadelphia, the patentee of different machines erected at Nesquehoning, Carbon county, Pennsylvania, used a vertical mixer with four shafts, which worked very well. It had, however, some defects. There was no possibility of ascertaining if the mixture had acquired a sufficient degree of plasticity, and when the mixer had to be cleaned, or some obstacle had to be removed from it, or an arm broke and had to be replaced, it became necessary to take the whole machine to pieces, which occasioned much trouble and a considerable loss of time. Still it was a decided improvement on all the European mixers. In this process, the slack is used without heating it or drying it previously. The moisture which it contains varies with the state of the atmosphere. Therefore the supply of lime water must be regulated accordingly. The difficulty of ascertaining the state of the materials, inside the mixer, suggested the idea of placing sliding doors around it. These doors facilitate the cleaning of the mixer and the removal of stones or pieces of iron which are often found in the coal-dust. By means of a movable spider, which allows the removal of each shaft without interfering with the others, and without removing the stationary frame in which they stand, a broken arm or a worn-out one can be replaced by new ones in half an hour. Although the compressing part of some only of the European presses is defective, the feeding part of almost all of them is very deficient. The materials to be pressed containing at certain times more moisture than at other times, the feeding of these materials to the press ought to be reduced or increased accordingly, and, to effect that purpose, simple and efficient means are necessary. The pressure should be applied gradually in order to expel, as much as possible, the moisture contained in the mixture and avoid cracks, which are the unavoidable result of a sudden pressure. An excess of compression spoils the fuel, prevents its free burning, and makes the ashes adhere to the surface of the lump, instead of falling through the grate into the ash pan. The fuel must be sufficiently compressed to bear transportation and reasonable handling and be still porous enough to insure free combustion. The shape of the fuel is also of great importance. Square lumps have too many sharp edges which break off easily when the coal is handled, and the flat surfaces meeting very often in the fire prevent the free access of the air. Cylindrical-shaped lumps are better, still they have sharp edges left. Round or egg-shaped lumps are evidently to be preferred. It is not without some good reasons that this shape has met with favor for nearly three centuries in Europe. To compress the plastic composition into round or egg-shaped lumps less power is required than to compress square ones of the same weight, as there are no corners to fill and, as a result, less friction. With round or egg-shaped lumps, no matter what amount of coal is piled on the fire, there is always sufficient space between the lumps to secure a good draft and to allow a free supply of oxygen. This invention is the result of many years of experimenting, and of struggling against repeated failures and adverse influences. It has not been presented to the community hastily, but has been well digested, and the means for realizing its benefits

have been wisely and well considered. The aid lent to the enterprise by the Lehigh Coal & Navigation Company of Philadelphia has greatly contributed towards its successful development.

THE JOHNSON TYPE FOUNDRY, MacKellar, Smiths & Jordan, Proprietors, Philadelphia. This house is one of the most extensively known, and probably the oldest, of the industrial works of Philadelphia. It was established in 1796, at a time when this city—now recognized as the manufacturing centre of the United States—numbered only about 40,000 inhabitants. Some attempts to establish type founding in Philadelphia were made before this time, but without permanent results. In 1796, Archibald Binny and James Ronaldson, natives of Edinburgh, Scotland, where Binny had practised type founding, laid the foundations of the business which has developed into this extensive factory, and which was the first successful enterprise of the kind established on the Western continent. Their assortment of type was not extensive, but it embraced the essential founts—brevier, bourgeois, long primer, small pica, pica, and two-line letters. They were obliging and attentive, and in twenty years made a fortune. They improved their foundry according to the increase of printing and the consequent demands of the trade; extending their assortment from pearl, of 180 lines in a foot, to 12-line pica, having 6 lines. Binny made an important improvement in the type mould, by which a caster could cast 6000 letters in a day with as much ease as he before could cast 4000, and it is due to his character and talents to say that letter founding owes more of its improvements and simplification to him than to any other individual since its invention. Archibald Binny must, of right, be considered as the father and successful introducer of letter founding in the United States. In 1815, the partnership ended by the withdrawal of Archibald Binny, and James Ronaldson, the remaining partner, continued the business alone for a time. He was succeeded by his brother, Richard Ronaldson, who carried on the business until 1833, when he was in turn succeeded by Lawrence Johnson, from whom the foundry is named, and George F. Smith. Lawrence Johnson was an Englishman by birth, who had emigrated to this country in boyhood. He was a printer by profession, and a man of energy and enterprise, who gave great attention to the devising of improvements in his business. He was one of the first to practise the art of stereotyping in Philadelphia, which he commenced here shortly after its establishment in England, where it was introduced about the year 1815. By his connection with the type foundry both callings were incorporated. George F. Smith had for many years been connected with the works as the head of its mechanical department, which he continued to manage after his admission into the firm. The accession of the new firm was signalized by the publication of a thick and substantial "Book of Specimens" of their type, consisting of impressions of the various styles of type manufactured by the firm, and many times larger than their original "Specimen Book." During all this time great scientific progress was being made, and the old slow process of hand moulding was giving way to machinery. The obstacles long in the road had been overcome, and the machine-made type were found even more solid, regular, and smooth than the best hand-made ones. In 1843, another change was made in the proprietorship of the house by the retiring of George F. Smith; and in 1845, Lawrence Johnson associated with him in partnership Thomas MacKellar and John F. Smith and Richard Smith. All these three had, as it were, grown up with the business. John F. and Richard Smith were sons of the former partner, and Thomas MacKellar had been, since 1833, foreman of the stereotype department. Lawrence Johnson died in 1860, and a new firm was then formed, consisting of the three surviving partners and Peter A. Jordan, who had also been, since 1854, in the employ of the house. The firm-name was shortly afterward changed to MacKellar, Smiths & Jordan, and the establishment was named The Johnson Type Foundry, in honor of the deceased partner. At this time a new "Specimen Book" was produced, under the editorship of Thomas MacKellar, which, both for mechanical skill and literary worth, may be regarded as a unique production. The "Typographic Advertiser," a quarterly periodical first published by the house in 1855, under the same editor, is still issued, and circulates throughout the United States and many foreign countries. "The American Printer," a practical work on printing, by Thomas MacKellar, is another production of the house, and a most beautiful specimen of typography. It has proved to be the most successful work of its class ever published, having passed through nine editions in as many years. The rapid growth of business calling for more extensive accommodations, a large building adjoining the original factory, and known as Sansom Street Hall, was added to the premises, and fitted up with every mechanical and mercantile

facility. The whole establishment is now of the extent of 120 by 150 feet and five stories high. The number of employés is about 300. The house is known in nearly every quarter of the globe, and has received orders from a country so remote as Australia. It may fairly take rank as the first type foundry in the world.

THOMAS MACKELLAR was born in New York city, August 12th, 1812. His father was a Scotchman by birth, and had been an officer in the British navy, but at the time of Thomas' birth he was residing in New York. His mother belonged to the old Brasher family, of the early Dutch pioneers of that place. At the age of fourteen he entered the printing office of the Harper Brothers. He afterwards was proof-reader to the Harpers, and, in 1833, removed to Philadelphia, where he was immediately installed as foreman in the stereotype department of The Johnson Type Foundry. In 1845, he became a member of the firm. A marked feature of The Johnson Type Foundry is its "Specimen Book," edited by Thomas MacKellar. This is an immense volume, containing some 600 or more pages, filled with impressions of the various styles and shades of type manufactured by the house, numbering some 1400 varieties, together with cuts, rules, etc., etc., in every form known to the craft. This is not only invaluable to printers, but is interesting to any one for the witty hits made in describing the type. It required five or six years to get it up. Everything in it is original with the senior partner, and much of the type-setting was of necessity done by him, as the style of type invariably illustrates the subject it speaks of, and compositors would not readily see the points. In his earlier years Thomas MacKellar was a frequent contributor to the press, and many of his poetical articles were very favorably received. In 1844, he published a volume of poems, under the title of "Droppings from the Heart." In 1847, another production of his pen appeared, called "Tam's Fortnight Rambles," and other poems, a volume of 216 pages. In 1853, he published "Lines for the Gentle and Loving," and, 1872, his last volume, "Rhymes Atween Times"—an exquisite specimen of fine typography—appeared.

JOHN F. SMITH was born in Philadelphia, January 20th, 1815. He is the eldest son of George F. Smith and Mary Ann Smith. He was first employed in the mercantile house of E. W. Seeley, where he acquired a sound business education. After remaining here four years, he entered the foundry of Richard Ronaldson. Upon the retirement from the firm of his father, George F. Smith, he was admitted into partnership. He married, in 1845, Elizabeth W. Munroe, of Philadelphia.

RICHARD SMITH, brother of John F. Smith, was born in Philadelphia, March 2d, 1821. He became connected with The Johnson Type Foundry when quite a youth, and mastered the trade completely. He was taken into partnership by Lawrence Johnson in 1845, and placed in charge of the mechanical department, the management of which he still retains. He has made many improvements in machinery and fancy and ornamental type, and probably has no superior in his line. He was married, in 1849, to Sarah A. Walker, of Philadelphia.

PETER A. JORDAN is the son of Frederick Jordan, manufacturer, and was born in Philadelphia, May 30th, 1822. After leaving school he became a clerk in the hardware business, and for a long period was with the house of Cowpland & Cresson, leaving them in 1854 for L. Johnson & Co. He married Adelaide Linton, daughter of John Linton, tobacco merchant, of Philadelphia. He is a man of business, and also of no mean literary ability.

WARREN, KIRK & CO., Manufacturers of Pitch, Tarred Felt, Anthracine, etc., Philadelphia. This firm was established, in 1851, by H. M. Warren and E. B. Warren, under the style of H. M. Warren & Co., the business being roofing exclusively. They were the originators of gravel roofing in Philadelphia. The trade of the house increasing very greatly, it was found necessary to commence the manufacture of their own material. From this the firm eventually branched out into two separate establishments, one devoted exclusively to the roofing business, and the other to the manufacture of the materials. The roofing business is now in the hands of a corporate company, which was organized in 1873, and is known as the Warren Roof Company. The firm of Warren, Kirk & Co. are occupied solely with the manufacturing business. The productions of the works are coal tar, roofing pitch, tarred felt, heavy oil, black varnish, carbolic acid, anthracine, etc. There are two factories worked by the firm—one at Filbert street wharf, on the Schuylkill river, which is of the extent of 100 by 300 feet, and another at Point Breeze, extending 200 by 500 feet. The firm consume annually about 60,000 barrels of coal tar,

each barrel containing about 40 gallons. From this is produced a variety of substances. Primarily the tar is distilled into two kinds of oils—a light oil and a heavy oil. From the latter is made lamp-black, printers' ink, etc. From the light oil a substance known as anthracine is got, which is exported to Europe, where the well-known aniline colors are extracted from it. The value of coal tar as a basis of production is incalculable, and the extent and variety of the articles which it can be made to yield for manufacturing purposes is matter of interesting investigation among chemists. This house also manufactures asphalte paving.

GILLINGHAM & GARRISON'S STEAM SAW MILLS, No. 943 Richmond street, Philadelphia. This extensive establishment was founded by Joseph E. Gillingham and David R. Garrison, constituting the firm of Gillingham & Garrison, who have successfully prosecuted their special line of business to the present time, and always at the same locality. The premises have a front on the west side of Richmond street of 300 feet, with a depth of 475 feet on Norris street; also 150 feet on the east side of Richmond street, and 250 feet deep, being a little over four acres in surface. The saw mill is furnished with a full line of machinery and appliances for the manufacture of lumber, and also cutting timber to order; the specialties being hemlock, white pine, and oak timber from the Susquehanna river, and yellow pine from Georgia and Florida; and from these materials girders, bridge timber, and ship timber are cut. Both proprietors are Philadelphians. The senior partner was born in 1830, and the junior in 1820.

FRENCH, RICHARDS & CO., Drug and Paint Manufacturers, Philadelphia. This house was founded in 1844. The articles manufactured are white lead, plaster, and paints; beside which they import largely drugs, chemicals, and window and plate glass. The offices, store, and warehouse are at Tenth and Market streets, and are comprised in one large and new building, 66 by 146 feet in extent, and six stories in height, with basement and sub-cellar. These latter and the upper stories are used as storerooms, the second story being used as a warehouse. On the main floor are the offices, sample rooms, and receiving and shipping rooms. The factory is at Callowhill street and York avenue, and is 59 by 74 feet and four stories in height. The upper story is used for mixing paint, which is ground on the floor below by improved machinery. Some of the machinery is of great power, several mills having a capacity to grind five tons of white lead daily. The machinery is driven by a steam engine of eighty horse power; the steam being supplied by four large boilers, each 50 feet in length, placed underneath the sidewalk. Large quantities of rock to be ground into plaster are stored in the cellar. An underground railway tunnel connects these cellars with a large six story warehouse on the opposite side of the street. This latter is a very large building, 60 by 58 feet, strongly girded with iron, and fitted to sustain very heavy pressure. Great quantities of Portland cement are stored here. In addition to these buildings there is another warehouse for storing plaster, which is connected with the stables. These are 50 by 100 feet, and have accommodations for twenty-two horses. The factory was destroyed by fire in 1855, and ten years later—in 1865—the premises at Tenth and Market streets suffered from a like disaster. Pending the rebuilding of the store the firm used the building on Tenth street between Market and Chestnut streets, which is now the Mercantile Library. The firm consists of Clayton and Samuel H. French, Charles W. Funk, and William Hazelton, Jr. This house has in store the largest stock of glass, both of domestic and foreign manufacture, which is to be found in the country. The elevator in use at the Market street building is noteworthy. It is a hydraulic lift, and runs from sub-cellar to the sixth floor, a distance of 85 feet. It is one of the finest works of the kind in the country. It has now (1875) been running for nearly nine years, and has never needed repair beyond an occasional new valve. It is very powerful, and will lift all that can be placed on the platform.

BERGDOLL & PSOTTA, Brewers of Lager Beer, Twenty-ninth and Parrish streets, Philadelphia. This brewery was originally established, in 1850, by the firm of Bergdoll & Schemm. In the following year the junior partner withdrew, and was succeeded by Charles Psotta, the style being changed to Bergdoll & Psotta, which has continued to the present time. The premises occupied by the firm are located at Twenty-ninth and Parrish streets, having a frontage of 550 feet on the former, and a depth of 400 feet on Poplar street

and Pennsylvania avenue. On these premises are erected the necessary buildings for the successful conducting of the business. These consist of two malt houses, one of which measures 175 by 55 feet, six stories high, and the other is 90 by 85 feet in dimensions. Besides these, the firm have another malting house in New York. The production of these three houses is stated to be 300,000 bushels per annum, of which fully two-thirds is produced in Philadelphia; and of this latter amount one-half is used by them in their brewery, the remainder being sold to different brewers in Philadelphia and vicinity. The principal portion of the barley used is Canada grown, and imported to order. Beside the malt houses above described are the necessary buildings requisite for the successful conducting of the business, such as storage vaults, ice houses, engine rooms, stables, etc. The brewery proper is fitted throughout with all the necessary machinery and conveniences—steam engines, pumping machinery, mash tubs, mash tanks, fermenting tubs, copper kettles, etc. There are three mash tubs, one with a capacity of 200 barrels, and the others of 250 barrels each. The annual production is 45,000 barrels of beer per annum. In this are consumed about 100,000 bushels of malt. The number of hands employed is about 100. There are about twelve kilns for malt drying. The senior partner attends to the brewing, and the junior to the financial affairs. The house has an office at 508 Vine street.

FRANKLIN SUGAR REFINERY, Harrison, Havemeyer & Co., Proprietors, Philadelphia. This house was established, in 1864, by the present firm, on Vine street above Third, on the site of the first sugar refinery in the United States which was conducted on the existing method. In 1866, the premises now used by the works were obtained, and the factory was removed to them. In 1872, the demand for the firm's products had increased so greatly that an extension to the original building was erected, by which the production was nearly doubled. The area now occupied by both buildings is about 45,000 square feet, exclusive of Swanson street, which divides the two departments. Each structure is completely isolated; the easternmost one, which is the original, being bounded by Bainbridge, Swanson, and Almond streets, and, towards the river, by Delaware avenue. The extension building has, in addition to the three streets mentioned, Penn street for its western line. The main building rises on the avenue ten stories high, including the two towers. It is so lofty that it is the first object that meets the eye of the sailor as he rounds Greenwich Point. The new buildings, put up in 1872, are three, six, and eight stories high on Swanson street, with cellars and sub-cellars; and, owing to the declivity of the ground, are but two, five, and seven stories high on Penn street. These two buildings are connected together by an enclosed iron bridge spanning Swanson street, and by a broad subterranean passage way or tunnel. The firm also have wharfage conveniences on the river front. The establishment is a most extensive one, and the operations are on a proportionately large scale. Four hundred and fifty workmen handle every day 300 hogsheads of sugar, that being the consumption of the crude material. The contents of each package are emptied into a circular pit on the ground floor, and after being mixed with water, the "liquor" is pumped to the topmost story of the building and received into iron tanks of the capacity of about 18,000 gallons. Thence the mixture passes into "defecators," which are pyramidal-shaped kettles, base upwards; around the inner edge of which, at the bottom, runs a circle of perforated copper pipe, through which steam is introduced; the impurities are projected upwards to the surface, and are displaced by appropriate apparatus. This process continues until all foreign matters are removed and nothing remains but the pure juice of sugar cane. This latter is now filtered through linen bags, and afterwards through animal charcoal, which is enclosed in circular iron vessels, called Desroue's filters after the name of the inventor. There are separate filters of this kind for white liquor and pan liquor. The white liquor is used further on in the process of refining; the pan liquor is a darker product, which is, in fact, raw sugar in solution. The animal charcoal, after being once used, requires renovation, which is effected on the premises in a division of the works which is of itself of large proportions. The dark product, decolorized by chemical filtration, as described, is now drawn into the "vacuum pan," which is a pear-shaped vessel about 20 feet high, of which there are four on the premises. Two of these were made in Berlin and two in Philadelphia—an achievement thought impossible but a few years ago. Powerful air pumps exhaust the air, and the boiling is consequently effected at a lower temperature. After this is done, the boiled juice is run into moulds—cone-shaped vessels of iron, all painted red on the outside and white within. There are about 25,000 of these vessels in use in this refinery. Every one is filled nearly to the top, and the last spare inches of space

are covered with the white fluid obtained by the agency of the Desrone filters. By the simple process of "displacement" the limpid liquor removes all the discolored fluid, slowly but surely displacing every particle of syrup in the mould, and leaving behind a pure, solid, white sugar. After being taken from the moulds, the cones or "loaves" of sugar are placed in kilns, where the sugar is deprived of its moisture by means of hot air. This stage being ended, it is transferred to the cutting, crushing, and powdering machines, where it is finally reduced to the various forms in which it is retailed by the grocer. Lower grade sugars are produced in the "centrifugal house." This class of goods is cleansed by extensive filtration and purification through the media of animal charcoal, and not by defecation. After having passed through the carbon, the decolorized syrup is placed in upright cylinders lined with fine brass wire. When the vessels are filled the perforated lining is set in rapid motion, and the centrifugal force dashes out the syrup, leaving behind, as a residuum, the finished sugar. All the brown sugars are boiled in a single vacuum pan, holding 80,000 pounds. Crystallization is obtained before the centrifugal force is resorted to. The products of this establishment are not only of local use, but great quantities are sent to the Western States, and a large portion finds a market in the South. Cargoes of this sugar are shipped to South America, and recently to Canada. The aggregate annual production of the works is at present (1875) about 120,000,000 pounds of sugar, worth on an average the sum of $11,000,000. The full capacity of the refinery is 150,000,000 pounds per annum.

PHŒNIX IRON COMPANY, Samuel J. Reeves, President. Office 410 Walnut street, Philadelphia. These works are among the oldest in the United States, having been first established in 1790, and in 1827, coming into possession of the late David Reeves, father of the present President of the company. They are located at Phœnixville, Chester county, and employ 1500 hands; and, in connection with the Phœnixville Bridge Company, are the largest manufacturers of iron bridges in the world. These works include blast furnaces, a rolling mill, and bridge works; and, in 1874, the company erected a new mill, designed for the finishing of iron, 628 feet long, 288 feet wide, and 30 feet high, covering under roof over four acres of ground. The furnaces are three in number, and their average annual capacity is 26,000 tons. The stacks are 48, 49, and 50 feet high, and the diameter of boshes 14 and 15 feet. These furnaces were erected in 1856, and have since been enlarged. The articles manufactured consist of rails, beams, girders, ship and building iron, Phœnix post columns (patented specialty), bridge and heavy irons generally. During the War of the Rebellion, many hundred of the cannon known as the "Griffen gun"—the invention of the present Superintendent of these works—were made at this establishment. The Phœnix iron beams, above cited, are also of his design. In the new mill just finished compound high and low-pressure engines have been introduced; and in this respect it is the pioneer; no other mills in the world have yet availed themselves of this great and important motive power. The annual capacity of these works is given as 20,000 tons. The first process is melting the ore in the blast furnace. Here the ore, with coal and a flux of limestone, is piled in and subjected to the heat of the fires, driven by a hot blast, and kept burning night and day. This ore and coal are dumped into the top of the furnace, being raised by an elevator. The iron, as it becomes melted, flows to the bottom of the furnace, and is drawn off below in a glowing stream. The blast for the furnace is driven by two enormous engines, each of 300 horse power, the air being heated by the consumption of the gases evolved from the material itself. Twice every day the furnace is tapped, and the stream of liquid iron flows out into moulds, and it is now termed pig-iron. The next process is "boiling," which is a modification of "puddling," also an improvement, and is generally used in the best iron works in the country. This is effected in an oven very intensely heated by a fire urged with a blast. In this the pigs are melted, and the oven is filled with molten iron, and is constantly stirred until it boils up or "ferments," as it is termed. This fermentation is caused by the combustion of a portion of the carbon in the iron, and as soon as the excess of this is consumed, the cinders and slag sink to the bottom of the oven, leaving the semi-fluid mass on the top. Stirring this about, the puddler forms it into balls of such a size as he can conveniently handle, which are taken out and conveyed on small cars to the "squeezer." Here the glowing ball of white-hot iron is placed, and forced, with a rotary motion, through a spiral passage, the diameter of which is constantly diminishing. By this process all the slag and cinder is squeezed out of the ball, and the iron is made to assume the shape of a short thick cylinder, termed

a "bloom." This is now re-heated and subjected to the process of rolling. The "rolls" are heavy cylinders of cast-iron placed almost in contact, and revolving rapidly by steam power. The bloom is caught between these rollers, and passed backward and forward until it is pressed into a flat bar from four to six inches wide and one and a half thick. These bars are then cut into short lengths, piled, heated again in a furnace, and re-rolled. When this process is completed they form the bar-iron of commerce. From the iron reduced into this form the various parts used in the construction of iron bridges are made by being rolled into shape, the rolls through which the various parts pass having grooves of the form it is desired to give to the pieces. These rolls, when they are driven by steam, obtain this generally from a boiler placed over the heating or puddling furnaces, and heated by the waste gases from the furnace. This arrangement was first made by John Griffen, the Superintendent of these works, under whose direction the first rolled iron beams over nine inches deep that were ever made were produced at this establishment. The process of rolling toughens the iron, seeming to draw out its fibres; and iron that has been twice rolled is deemed fit for ordinary uses; but for the various parts of a bridge, however, where great toughness and tensile strength are necessary, as well as uniformity of texture, the iron is rolled a third time. The bars are therefore cut again into pieces, piled, reheated, and rolled again. A bar of iron which has been rolled twice is formed from a pile of fourteen separate pieces of iron that have been rolled only once, or "muck bar," as it is called; while the thrice rolled bar is made from a pile of eight separate pieces of double-rolled iron. If, therefore, one of the original pieces of iron has any flaw or defect, it will form only a hundred and twelfth part of the thrice-rolled bar. The uniformity of texture and toughness of the latter are so great that they may be twisted, cold, into a knot without showing any signs of fracture. The iron bars, whether cold or hot, are sawn to the various required lengths by hot or cold circular saws, which revolve with great rapidity. The "Phœnix columns" are tubes made from four or from eight sections rolled in the usual way, and riveted together at their flanges. When necessary, such columns are joined together by cast-iron joint-blocks, with circular tenons which fit into the hollows of each tube. The machine shop covers over an acre of ground, and most of the operations performed there, and all of the tools with which they are done, are due entirely to modern invention, many of them within the last ten years.

KEYSTONE KNITTING MILLS, Thomas Dolan & Co., Proprietors, Philadelphia. This extensive establishment is situate on Oxford street at the corner of Hancock. It is devoted to the production of shawls and hosiery. The machinery comprises six sets of cards, and is very complete in itself and of the most improved character. For the disposal of the productions there are commodious ware-rooms at Nos. 24 and 26 Bank street, Philadelphia, and at Nos. 90, 92, and 94 Franklin street, New York. The co-partnership consists of Thomas Dolan and R. Williams, Jr. The senior partner enjoys the reputation of being a singularly shrewd business man, and of possessing remarkable executive abilities. His management of the establishment has been successful to a very marked degree.

JOSEPH NEVIL & SONS, Manufacturers of Moroccos and Fancy Leathers, Nos. 1012, 1014, and 1016 St. John street, Philadelphia. The business was established in 1841, over a third of a century ago, by the senior partner, for the manufacture of moroccos and fancy leather. At the commencement of the enterprise about thirty hands were employed, producing at least $50,000 worth of goods during the first year. After the lapse of eighteen years the proprietor admitted his eldest son, William H. Nevil, in 1859, into partnership. In 1864, his second son, John R., became associated in the firm; again, in 1871, Joseph, Jr., also entered the co-partnership; and, in 1874, George W. was the fourth to participate in the business. The factory is located at Nos. 1012, 1014, and 1016 St. John street, above Beaver, having a frontage of 100 feet, and a depth of 150 feet to Canal street. The warehouse and store is at No. 144 Margaretta street. The business has materially increased in extent, and from time to time superior labor-saving machinery has been added. At the present period 100 hands are engaged, while the appliances in use in the factory represent the labor of at least an equal number. As already stated, the morocco and fancy leather business in all its varieties occupies the attention of the firm. They are the largest producers of and dealers in these specialties in Philadelphia; morocco and leather of every shade of color being produced in the establishment. In addition to these, they manufacture also a superior article of black morocco, of which, as well as the former, they dispose in very large quantities; the business at the present time, notwithstanding

KEYSTONE KNITTING MILLS
THOMAS DOLAN
KEYSTONE KNITTING MILLS

the financial depression, reaching fully $300,000 per annum. The goods are manufactured more especially for shoemakers, book-binders, hatters, coach-makers, saddlers, and trunk makers. The great success of the house is due to the fact, that all the partners are practical men, the four sons having all been brought up to the business in this establishment, and served a regular apprenticeship thereto; they are consequently able to direct and manage the concern systematically.

JOSEPH NEVIL was born, 1810, in Philadelphia. After leaving school he was apprenticed to learn the morocco business with William G. McNeely, at Fourth street and Girard avenue, at the termination of which he became interested in the business as a partner in several other firms prior to his association with his sons.

MAXWELL ROWLAND & CO., Manufacturers of Spades, Shovels, Scoops, etc., Philadelphia. This house was established by Jonathan Rowland, the father of the present senior partners, in 1826. It is situated at Holmesburg, in the Twenty-third Ward of the city, and embraces an area of twenty acres, over which the various shops are spread. The motive power is supplied principally from the creek which runs through the property, known as the Pennypack creek. On this two mill dams have been built by the firm at various times, in order to obtain the necessary pressure of water. The engine employed is one of thirty-five horse power. The number of hands averages about sixty. The production includes every kind of shovel or spade in use; the number of which turned out annually by the firm is about 20,000 dozen, or 240,000 pieces. This represents a money value of about $175,000. The quantity of material consumed yearly is 350 tons of bar iron, about 100 tons rolled steel, and twenty tons of "back-strap" iron. The handles of the shovels are made of ash wood, and are manufactured chiefly in Maine and Michigan; the short handles coming from the former State, and the long ones from the latter. Ash is selected for this purpose because it is more easily bent and is less injured by exposure to the weather than other woods. There are in the establishment several tilt hammers of the weight of 300 and 400 pounds respectively. The goods are made for Pennsylvania trade principally, but are also shipped to all parts of the country, and to Canada and South America. The firm have a railroad communication at the works by which mainly their productions are sent out. The present firm consists of Maxwell Rowland, Charles Rowland, Samuel Rowland, William Rowland, and William Helverson, and was organized in June, 1854. Up to the year 1840, the style of the firm was Jonathan Rowland; it then became Jonathan Rowland & Sons, continuing so until 1854, when it was changed to its present form. The founder of the house, Jonathan Rowland, died in 1855.

JOHN A. SCOTT, Manufacturer of Jacquard Looms, Philadelphia. The buildings of this factory are situated at 316 Ella street, and are of the extent of 54 by 36 feet; the size of the lot on which they stand being 150 by 54 feet. The number of hands employed is twelve. The annual production is about 200 looms of all kinds per annum, besides repairing work, of which a great amount is done. The father of the present owner established a trade of this kind in the same vicinity about thirty or forty years ago. He was the first to make a double box lathe in this country. He died in 1852, and was succeeded by two of his employés, Riehl and Chambers, who continued the business. The son—the owner of these works—was then in the South, which he shortly afterwards left. He came to Philadelphia, and for a time worked as an employé in this city and in New Jersey. Finally he established himself in business, and by steady, persistent energy has worked himself into his present position. The factory is situated in the midst of the carpet manufacturing district, and most of the neighboring firms are his customers. These looms—invented near a hundred years ago by Joseph Jacquard and his predecessor Vaucanson—are indispensable for the weaving of all kinds of figured work, whether in silks, shawls, bed-covers, or carpets. The proprietor of this establishment is, in the strictest sense, a self-made man, and has overcome the greatest obstacles by the simple force of persistent energy and determination. Beside his Philadelphia trade, he has customers in other States, some being as far away as Kansas.

CLAXTON, REMSEN & HAFFELFINGER, Publishers, Booksellers, and Stationers, Nos. 624, 626, and 628 Market street, Philadelphia. The business of this house dates from January 20th, 1868, when Edmund Claxton, George Remsen, and Charles C. Haffelfinger—constituting the present firm of Claxton, Remsen & Haffelfinger—founded

the establishment which has so wonderfully increased since its inception. All the partners learned their business of John Grigg, of Philadelphia, and while they were with him the house became Grigg, Elliott & Co. Of this firm Edmund Claxton and John Remsen were members previous to its dissolution, January 1st, 1850, and also partners in the successive firms of Lippincott, Grambo & Co. and J. B. Lippincott & Co., with which last-named co-partnership the junior partner, Charles C. Haffelfinger, was also connected. Their original place of business was at Nos. 819 and 821 Market street, which after a few years was found to be altogether inadequate to meet the demands of their rapidly augmenting trade, and they accordingly selected another site more commodious in extent, whereon was erected a magnificent iron building, which they now occupy. This structure, designed by John McArthur, Jr., the well-known architect, is one of the most imposing in the city, and is specially adapted to the requirements of the publishing business, having steam power introduced on each floor, and being brilliantly lighted from front, rear, and by skylights. The basement and cellar are devoted to the storage of their stock of heavy stationery, school-books, and stereotype plates. The first floor is occupied as a salesroom for miscellaneous books, upon every subject and in every variety of binding. This room is traversed by galleries to secure speedy access to the literary treasures on the upper shelves. In the rear are the counting-rooms and offices of the firm, flooded with light from skylights, and elegantly and elaborately fitted up with every modern convenience for the comfort of its occupants. On the second floor is the stationery and fancy goods department, in which a very heavy business is transacted, not only in plain and staple articles, but in the more ornate, unique, and recherché of both foreign and domestic manufacture. The third, fourth, and fifth stories are devoted exclusively to the manufacturing of books, including binding, embossing, gilding, etc. Here may be seen the whole process at a glance. On the main floor the counters and shelves are filled with the popular and scientific literature of the day, beside reprints of standard authors of England and America, including many works of a practical, useful, and didactic character. Beautiful editions of "Gibbons' Rome, with Notes by Rev. H. H. Milman;" "Goldsmith's Animated Nature" and "Complete Works;" "Great Truths by Great Authors;" "Hume's England;" "Rollin's Ancient History;" "Hale's Dictionary of Poetical Quotations;" the "Comprehensive Commentaries of the Holy Bible;" the "Encyclopædia of Religious Knowledge;" Roper's "Catechism of the Steam Engine;" White's "Elements of Theoretical and Descriptive Anatomy," and many other equal standard works have all had large sales. The most successful scientific work published by this house is Trautwine's "Civil Engineer's Pocket-Book," which reached a sale of 8000 copies within the first two years of its publication, and the demand is steadily increasing. Another valuable work just issued by the firm is that entitled "Fairmount Park and the International Exhibition at Philadelphia," which is profusely illustrated with vignettes and engravings representing the romantic scenery of the Schuylkill, Wissahickon, etc.; the statuary, fountains, the Exposition buildings, with a full list of the officers of the various boards; besides a world of history, revolutionary reminiscences, Indian legends, and other equally interesting information of that celebrated pleasure ground, which is not only the boast of Philadelphia, but to which her citizens can proudly point as the largest in the world. The book is elegantly printed on toned paper, and neatly bound in cloth. The great success attendant upon this firm from their very commencement is due to their thorough knowledge of the business, and to their enterprise, industry, and energy, from which have resulted the immense establishment now under their control, and also the great edifice, at once an honor and ornament to Philadelphia.

PHILADELPHIA FLOURING MILLS, Nathan Brooke & Co., Proprietors, Philadelphia. These mills are situated on Thirteenth, Noble, and Hamilton streets, and occupy a space of ground 220 by 90 feet, the buildings being four stories in height. They are the largest flouring mills in the State, and also one of the oldest, having been established about thirty years. There are in the establishment sixteen pairs of burrs, which have a capacity of grinding from 3000 to 3500 bushels of wheat, producing 700 barrels of flour, in the course of twenty-four hours. The mills are kept running night and day, and are worked by two sets of hands. The flour of this firm is known by the brands "Premium" and "Redstone," which brands have not only an extensive reputation in this market, but also in the West Indies and South America, large quantities of them being regularly shipped to those markets. The mills have a railroad running into them, by which means direct communication is established with all points. The machinery of the factory is noteworthy for its power, extent, and

completeness. The cleaning apparatus, by which the rough ends, etc., of the grain is removed previously to its grinding, is worthy of special mention.

CONGER SHERMAN, Printer, was born near Albany, New York, in 1793. When very young he entered the printing office of the Albany *Journal*, where he remained until he was eighteen years old. He removed to Philadelphia in 1811, and soon afterwards found employment as a journeyman printer, at which occupation he worked until 1830, when having, by the practice of a severe economy, gathered quite a respectable sum of money, he purchased the printing establishment of Towar & Hogan, booksellers, Market street, Philadelphia. He began in rather a small way, with four or five hand presses; but he prospered nevertheless, so that, in 1837, he was enabled to erect a steam press, which was the second one in the city for book work. For over twenty years thereafter, in several localities, lastly at the commodious establishment at the southwest corner of Cherry and Seventh streets, he was engaged in the production of books which for beauty of typography have seldom been surpassed. He retired from active pursuits in 1864. He died November 25th, 1867.

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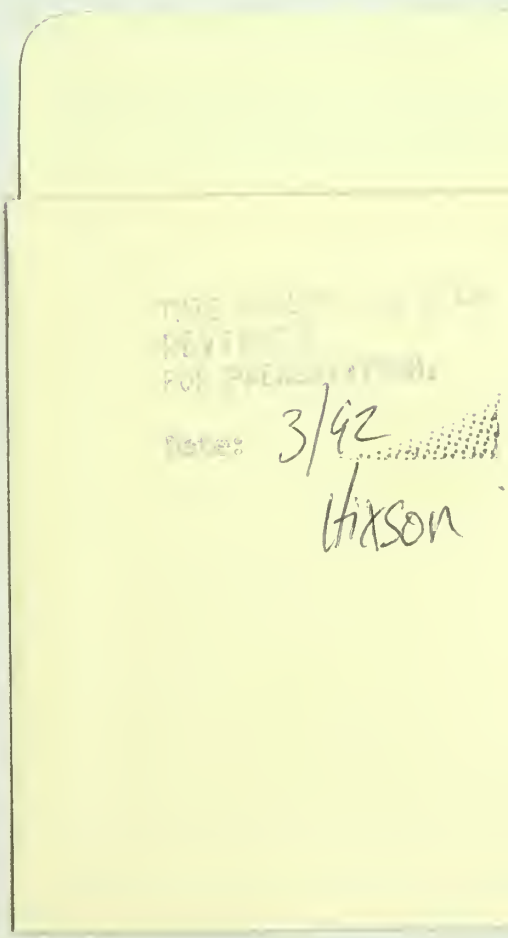

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